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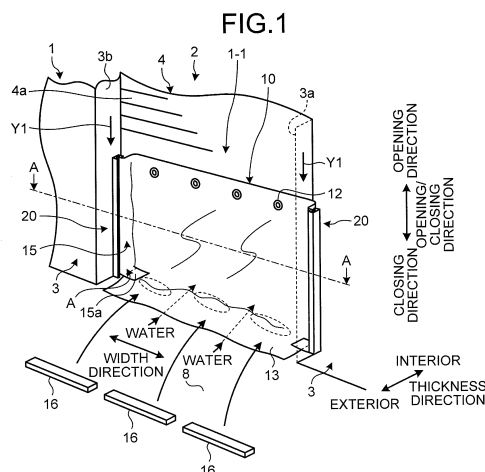
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(54) **OPENING PART WATERPROOFING DEVICE AND OPENING PART WATERPROOFING SHEET**

(57) A waterproof device for an opening includes: a sheet 10 placed over an opening 2, the opening making an interior and an exterior of a structure 1 communicate and being opened and closed by an opening/closing member 4; and a holding part 20 that holds the sheet for the structure at a position exterior of the opening/closing member, wherein the holding part holds the sheet so that the sheet covers a predetermined area which is a lower end part in a vertical direction of the opening/closing member and a part of the structure adjacent to the predetermined area together to close a lower end area in the vertical direction of the opening and so that a lower end part 13 in the vertical direction of the sheet extend along a floor toward the exterior.



Description

Field

5 **[0001]** The present invention relates to a waterproof device for an opening and a waterproof sheet for an opening.
Background

[0002] In related art, technologies for preventing ingress of water through an opening that is opened and closed with an opening/closing member have been proposed. For example, Patent Literature 1 discloses a technology for a shutter system having an water ingress preventing function, in which a bendable waterproof sheet is provided on a rear face of
10 a shutter, a guide member is provided with a seal member in a manner opposed to the waterproof sheet, so that the waterproof sheet is pressed against the seal member when the pressure of flood water flowing toward the shutter acts on the surface of the shutter.

Citation List

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Patent Literature

[0003] Patent Literature 1: Japanese Patent No. 4459740

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Summary

Technical Problem

[0004] There still is room for improvement in prevention of water ingress through an opening. For example, water may
25 enter through routes other than through a gap between the shutter and the guide member. It is desired that water ingress through an opening can be properly prevented.

[0005] An object of the present invention is to provide a waterproof device for an opening and a waterproof sheet for an opening capable of preventing ingress of water through an opening that is opened and closed with an opening/closing member.
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Solution to Problem

[0006] A waterproof device for an opening according to the present invention includes a sheet placed over an opening, the opening making an interior and an exterior of a structure communicate and being opened and closed by an opening/closing member; and a holding part that holds the sheet for the structure at a position exterior of the opening/closing member, wherein the holding part holds the sheet so that the sheet covers a predetermined area which is a lower end part in a vertical direction of the opening/closing member and a part of the structure adjacent to the predetermined area together to close a lower end area in the vertical direction of the opening and so that a lower end part in the vertical direction of the sheet extend along a floor toward the exterior.
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[0007] With the waterproof device for an opening described above, the sheet covers the opening/closing member and the structure together, which can prevent ingress of water through the opening.

[0008] In the waterproof device for an opening, it is preferable that the holding part holds the sheet in a slack state, permitting the sheet to be bent closer to the opening/closing member than the holding member and come into contact with the predetermined area.

[0009] With the waterproof device for an opening described above, the sheet can cover the opening/closing member in a state held by the holding part, and can close gaps to prevent ingress of water.
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[0010] In the waterproof device for an opening, it is preferable that the sheet covers the predetermined area, the floor adjacent to the predetermined area, and wall faces adjacent to the predetermined area and opposed to each other in a width direction of the opening all together, and the sheet can be placed in a state in which ends in the width direction of a part corresponding to the floor and lower ends of parts corresponding to the wall faces overlap.
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[0011] With the waterproof device for an opening described above, ingress of water through corners where the wall faces and the floor intersect can be prevented.

[0012] In the waterproof device for an opening, it is preferable that the parts of the sheet corresponding to the wall faces can cover the wall faces and the floor together.

[0013] With the waterproof device for an opening described above, the sheet covers the wall faces and the floor together, which can prevent ingress of water.
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[0014] In the waterproof device for an opening, it is preferable that the sheet has slits separating the ends in the width direction of the part corresponding to the floor and the lower portions of the parts corresponding to the wall faces from

each other.

[0015] With the waterproof device for an opening described above, the ends in the width direction of the part of the sheet corresponding to the floor and the lower ends of the parts of the sheet corresponding to the wall faces can be easily made to overlap.

[0016] In the waterproof device for an opening, it is preferable that further comprising: a pressing member that presses a part of the sheet extending along the floor against the floor.

[0017] With the waterproof device for an opening described above, the pressing member can prevent floating of the sheet.

[0018] In the waterproof device for an opening, it is preferable that the pressing member is water absorbent.

[0019] With the waterproof device for an opening described above, the pressing member can be reduced in weight.

[0020] In the waterproof device for an opening, it is preferable that further comprising: pressing members that press the sheet against the structure, wherein the pressing members are arranged at least on a part of the sheet extending along the floor and continuously along a circumference of the opening.

[0021] With the waterproof device for an opening described above, the sheet is pressed against the structure by the pressing members that are arranged continuously, which prevents ingress of water through between the sheet and the structure.

[0022] In the waterproof device for an opening, it is preferable that the pressing members are deformable to match with a shape of the structure.

[0023] With the waterproof device for an opening described above, gaps between the sheet and the structure are reduced.

[0024] In the waterproof device for an opening, it is preferable that the pressing members arranged on the part of the sheet extending along the floor deform to match with a shape of the floor by weights thereof.

[0025] With the waterproof device for an opening described above, since the pressing members are deformed by their weights, placement of the pressing members is easy.

[0026] In the waterproof device for an opening, it is preferable that the pressing members arranged on the part of the sheet extending along the floor are continuously provided from one end in the width direction of the opening to the other.

[0027] With the waterproof device for an opening described above, ingress of water through gaps between the floor and the sheet is prevented.

[0028] In the waterproof device for an opening, it is preferable that the sheet covers the predetermined area, the floor adjacent to the predetermined area, and wall faces adjacent to the predetermined area and opposed to each other in a width direction of the opening all together, and the pressing members arranged on the part of the sheet extending along the floor are placed to press the sheet against the wall faces.

[0029] With the waterproof device for an opening described above, ingress of water through gaps between the sheet and the wall faces is prevented.

[0030] In the waterproof device for an opening, it is preferable that the pressing members arranged on the part of the sheet extending along the floor have corner portions having a shape corresponding to that of corners where the floor and the wall faces intersect, and are placed in a state in which the sheet is between the corner portions and the corners.

[0031] With the waterproof device for an opening described above, ingress of water through gaps between the sheet and the corners is prevented.

[0032] In the waterproof device for an opening, it is preferable that the ends of the pressing members in the width direction of the opening are deformable to match with shapes of the wall faces by being pressed against the wall faces.

[0033] With the waterproof device for an opening described above, ingress of water through gaps between the sheet and the wall faces and between the sheet and the corners is prevented.

[0034] In the waterproof device for an opening, it is preferable that the ends in the width direction of the part of the sheet extending along the floor is subjected to end processing beforehand according to the width of the opening.

[0035] With the waterproof device for an opening described above, the sheet is prevented from being creased when the sheet is placed, which increases water stopping performance.

[0036] In the waterproof device for an opening, it is preferable that further comprising: a supporting member that supports the opening/closing member against a force applied by water pressure from the exterior to prevent deformation of the opening/closing member.

[0037] With the waterproof device for an opening described above, deformation of the opening/closing member is prevented, which can prevent the opening/closing member from getting out of the guides, and prevent degradation in water stopping performance of respective parts due to gaps or the like caused because of the sheet being pulled as a result of deformation such as warping of the opening/closing member.

[0038] A waterproof sheet for an opening according to the present invention, wherein the waterproof sheet is placed over an opening, the opening making an interior and an exterior of a structure communicate and being opened and closed by an opening/closing member, wherein the waterproof sheet is placed at a position exterior of the opening/closing member, the waterproof sheet is held for the structure in a slack state, permitting the waterproof sheet to come into

contact with the opening/closing member, and with a lower end part thereof in a vertical direction extending along a floor toward the exterior, and the waterproof sheet covers a predetermined area at a lower end part in the vertical direction of the opening/closing member and a part of the structure adjacent to the predetermined area to close a lower end part in the vertical direction of the opening.

[0039] With the waterproof sheet for an opening described above, the sheet covers the opening/closing member and the structure together, which can prevent ingress of water through the opening.

Advantageous Effects of Invention

[0040] A waterproof device for an opening and a waterproof sheet for an opening according to the present invention have an effect that water ingress through an opening that is opened and closed with an opening/closing member can be prevented.

Brief Description of Drawings

[0041]

FIG. 1 is a perspective view illustrating a waterproof device for an opening according to a first embodiment.

FIG. 2 is a horizontal sectional view of the waterproof device for an opening according to the first embodiment.

FIG. 3 is a vertical sectional view of the waterproof device for an opening according to the first embodiment.

FIG. 4 is a diagram illustrating an example of a state in which pressing members are placed.

FIG. 5 is a perspective view illustrating a state in which a pressing member according to a first modified example of the first embodiment is placed.

FIG. 6 is a sectional view illustrating a state in which the pressing member according to the first modified example of the first embodiment is placed.

FIG. 7 is an explanatory view of a gap at a corner.

FIG. 8 is a perspective view illustrating a state in which a pressing member according to a second modified example of the first embodiment is placed.

FIG. 9 is a sectional view illustrating a state in which the pressing member according to the second modified example of the first embodiment is placed.

FIG. 10 is an explanatory view of a placement method in which a sheet is pressed against a guide rail by the pressing member.

FIG. 11 is a diagram illustrating another example of a pressing member pressing a sheet against a guide rail.

FIG. 12 is a diagram illustrating an end in the width direction of a sheet according to a third modified example of the first embodiment.

FIG. 13 is a diagram illustrating a sheet according to a fourth modified example of the first embodiment.

FIG. 14 is a diagram illustrating a waterproof device for an opening according to a fifth modified example of the first embodiment.

FIG. 15 is a diagram illustrating an example of arrangement of the pressing member.

FIG. 16 is a sectional view illustrating a sheet according to a sixth modified example of the first embodiment.

FIG. 17 is a sectional view illustrating another sheet according to the sixth modified example of the first embodiment.

FIG. 18 is a sectional view illustrating still another sheet according to the sixth modified example of the first embodiment.

FIG. 19 is a diagram illustrating a waterproof device for an opening placed on a hinged door.

FIG. 20 is a diagram illustrating a waterproof device for an opening placed on an automatic door.

FIG. 21 is a diagram illustrating an example of a method for attaching a sheet on a grille shutter.

FIG. 22 is a diagram illustrating a pressing member according to an eighth modified example of the first embodiment.

FIG. 23 is a diagram illustrating a supporting member of a waterproof device for an opening according to a second embodiment.

FIG. 24 is a diagram illustrating a supporting member according to a first modified example of the second embodiment.

FIG. 25 is a diagram illustrating another supporting member according to the first modified example of the second embodiment.

FIG. 26 is a diagram illustrating a supporting member according to a second modified example of the second embodiment.

FIG. 27 is a diagram illustrating another supporting member according to the second modified example of the second embodiment.

FIG. 28 is a diagram illustrating a supporting member according to a third modified example of the second embodiment.

FIG. 29 is a diagram illustrating another supporting member according to the third modified example of the second embodiment.

FIG. 30 is a diagram illustrating a supporting member according to a fourth modified example of the second embodiment in an installed state.

FIG. 31 is a diagram illustrating the supporting member according to the fourth modified example of the second embodiment in a stored state.

FIG. 32 is a perspective view illustrating a main part of a sheet according to a third embodiment placed over an opening.

FIG. 33 is a development view of the sheet according to the third embodiment.

FIG. 34 is a perspective view illustrating a main part of a sheet according to a first modified example of the third embodiment placed over an opening.

FIG. 35 is a development view of the sheet according to the first modified example of the third embodiment.

FIG. 36 is a perspective view illustrating a main part of a sheet according to a second modified example of the third embodiment placed over an opening.

FIG. 37 is a development view of the sheet according to the second modified example of the third embodiment.

FIG. 38 is a perspective view of a main part of a sheet according to a third modified example of the third embodiment placed over an opening.

FIG. 39 is a development view of the sheet according to the third modified example of the third embodiment.

Description of Embodiments

[0042] A waterproof device for an opening and a waterproof sheet for an opening according to embodiments of the present invention will be described in detail below with reference to the drawings. Note that the present invention is not limited to the embodiments. Furthermore, components in the embodiments below may include those easily conceivable by those skilled in the art or those that are substantially identical.

[First Embodiment]

[0043] A first embodiment will be described with reference to FIGS. 1 to 4. The present embodiment relates to a waterproof device for an opening and a waterproof sheet for an opening. FIG. 1 is a perspective view illustrating the waterproof device for an opening according to the first embodiment of the present invention; FIG. 2 is an horizontal sectional view of the waterproof device for an opening according to the first embodiment; FIG. 3 is a vertical sectional view of the waterproof device for an opening according to the first embodiment; and FIG. 4 is a diagram illustrating an example of a state in which pressing members are placed.

[0044] Shutters are often attached to external openings of structures such as buildings. For example, shutters are often attached to an entrance of an underground parking lot that is likely to be flooded in case of floods, and an entrance of a store in which merchandise is likely to be damaged in case of flooding. Since shutters have structures with many gaps, such facilities may suffer damage caused by flooding through the gaps of the shutters in case of unexpectedly heavy downpours and floods.

[0045] It is conceivable to replace a lower part of a shutter with a waterproof plate (panel) as a measure against flooding, but this is generally likely to result in high cost, which may be difficult to be accepted by users.

[0046] A waterproof device 1-1 for an opening according to the present embodiment places a sheet in front of a shutter to allow stop of water in an easy and inexpensive manner. The sheet can cover the shutter together with part of a structure surrounding the shutter to close the gaps between the shutter and the structure and properly stop water. Thus, according to the waterproof device 1-1 for an opening of the present embodiment, damage inside a building due to flood disaster can be alleviated.

[0047] The waterproof device 1-1 for an opening illustrated in FIG. 1 closes an opening 2 of a structure 1 to prevent water ingress from the exterior to the interior. The structure 1 is a building structure such as a factory, a warehouse, a garage, a store, or a house, and has the opening 2. The opening 2 is formed in a wall or the like of the structure 1 and makes the exterior and the interior of the structure 1 communicate.

[0048] Herein, the exterior refers to a side relatively closer to the external space of the structure 1 and the interior refers to a side relatively farther from the external space of the structure 1. In other words, the exterior refers to a side upstream of water entering the structure 1 from the external space, that is, the side which water reaches first. The opening 2 can make the external space (exterior) and the internal space (interior) of the structure 1 communicate, for example. The opening 2 in the present embodiment is formed in a wall 3 that is part of the outer shell of the structure 1, and through the wall 3 to make the exterior and the interior of the structure 1 communicate. Note that the opening 2 is not limited thereto and may be formed in a wall partitioning the interior of the structure 1.

[0049] A shutter curtain 4 is an opening/closing member that opens and closes the opening 2. The shutter curtain 4 moves in the opening/closing direction, that is, upward and downward in the vertical direction in the present embodiment.

The shutter curtain 4 is a series of connected slats made by connecting multiple slats in the opening/closing direction. In the present embodiment, the opening direction is the upward direction and the closing direction is the downward direction.

[0050] As illustrated in FIG. 2, the shutter curtain 4 is guided by guide rails 5. The wall 3 has wall faces 3a and 3b that form the opening 2. The wall face 3a and the wall face 3b are opposed to each other in the width direction of the opening 2. The guide rails 5 are placed on the respective wall faces 3a and 3b and opposed to each other in the width direction. Both ends of the shutter curtain 4 in the width direction are respectively inserted in grooves 5a of the guide rails 5. The grooves 5a extend in the opening/closing direction and movably guide the shutter curtain 4 in the opening/closing direction.

[0051] As illustrated in FIG. 3, the shutter curtain 4 can be wound around a wheel drum 6. The opening 2 can be opened by winding the shutter curtain 4 around the wheel drum 6 and the opening 2 can be closed by unwinding the shutter curtain 4 from the wheel drum 6. Winding and unwinding of the shutter curtain may be manual or may be automatic using a drive device such as a motor. The wheel drum 6 is placed in a case 7. The case 7 is attached to a wall or the like above the opening 2. A shutter according to the present embodiment includes the shutter curtain 4, the guide rail 5, the wheel drum 6, and the case 7.

[0052] Referring back to FIG. 1, the waterproof device 1-1 for an opening includes a sheet 10, holding parts 20, and pressing members 16. The sheet 10 is placed over the opening 2 and has a width and a length that can close a lower end area in the vertical direction of the opening 2. The sheet 10 has a rectangular shape, for example. The sheet 10 is watertight and can serve as a waterproof sheet for an opening. The sheet 10 is also flexible and may be elastic. Examples of the material for the sheet 10 include resin, rubber, and cloth having a surface coated with resin or the like. The sheet 10 is preferably made of a material that can be deformed with deformation of the opening/closing member such as the shutter curtain 4 due to water pressure.

[0053] The sheet 10 has a width larger than that of the shutter curtain 4. Furthermore, the sheet 10 preferably has a width larger than that of the opening 2, that is, the distance between the wall face 3a and the wall face 3b. The sheet 10 has a length in the opening/closing direction determined on the basis of the water depth to cover. Specifically, the entire length of the sheet 10 is determined on the basis of the range from the lower end to an upper area in the vertical direction of the shutter curtain 4 which the sheet 10 is to cover to prevent ingress of water. In the description below, an area of the shutter curtain 4 to be covered by the sheet 10 will be referred to as a "predetermined area" (see the reference numeral 41 in FIG. 3). The predetermined area 41 is a lower end area in the vertical direction of the shutter curtain 4.

[0054] The holding parts 20 hold the sheet 10 at a position exterior of the shutter curtain 4 for the structure 1. More specifically, the holding parts 20 hold the sheet 10 to cover the predetermined area 41 of the shutter curtain 4 together with part of the structure 1 adjacent to the predetermined area 41 so as to close the lower end area in the vertical direction of the opening 2. The holding parts 20 also hold the sheet 10 so that a lower end part in the vertical direction of the sheet 10 extends toward the exterior along a floor 8. As a result, the sheet 10 can close the gaps of the shutter curtain 4 and gaps between the shutter curtain 4 and the structure 1 and prevent ingress of water into the interior.

[0055] As illustrated in FIG. 2, the holding parts 20 each have a rail 21 and a bead 22. The rails 21 are respectively attached to the wall faces 3a and 3b. Alternatively, the rails 21 may be fixed to the guide rails 5. The rails 21 have a C-shape in cross section and each have a slit in the faces that are opposed to each other. The rails 21 extend in the opening/closing direction over a range corresponding to the predetermined area 41 of the shutter curtain 4. Thus, the rails 21 are provided in a range corresponding to a range from the lower end of the shutter curtain 4 to the upper end of the predetermined area 41. Note that the slits of the rails 21 may be formed in faces facing the shutter curtain 4.

[0056] The beads 22 can be inserted into the rails 21. The beads 22 have a C-shape in cross section with both ends of the C shape protruding outward. The beads 22 are made of a material that is lightweight and flexible, such as a resin material. Alternatively, the beads 22 may be made of a metallic material such as aluminum. Note that the rail 21 and the bead 22 may be integrated.

[0057] The sheet 10 is provided with zip fasteners 11 at both ends in the width direction. The zip fasteners 11 are provided at edges of the sheet 10 and extend in the length direction (opening/closing direction) of the sheet 10. The zip fasteners 11 have a cylindrical shape and can be inserted into hollow portions of the beads 22. Since the slit width of the beads 22 is smaller than the outer diameter of the zip fasteners 11, the zip fasteners 11 are kept from getting out of the beads 22 through the slits. Note that the zip fasteners 11 is not limited to those having a circular cross sectional shape but may have a polygonal cross sectional shape, for example.

[0058] For placing the sheet 10 over the opening 2, the zip fasteners 11 of the sheet 10 are first inserted into the hollow portions of the beads 22. Subsequently, as shown by an arrow Y1 in FIG. 1, the beads 22 are inserted into the rails 21 in the opening/closing direction. The sheet 10 has a width larger than the width W of the opening 2 (see FIG. 2), in other words, the distance between the wall face 3a and the wall face 3b. Thus, the sheet 10 is slack in a state in which both ends of the sheets are held by the holding parts 20. In other words, the holding parts 20 hold the sheet 10 in a state in which the sheet 10 is slack, permitting the sheet 10 to bend closer to the shutter curtain 4 than the holding parts 20 and come into contact with the predetermined area 41. This allows the sheet 10 to be placed along the guide rails 5 and the shutter curtain 4 in a state in which the sheet 10 is held by the holding parts 20 and in contact with the guide rails 5 and

the shutter curtain 4. Note that the sheet 10 is preferably slack to such an extent that the sheet 10 can come in close contact with the shutter curtain 4, the guide rail 5, and the wall faces 3a and 3b in a state held by the holding parts 20 and before water pressure is applied thereto.

[0059] Note that the means for holding the sheet 10 for the structure 1 is not limited to that using the beads 22 and the rails 21. For example, the sheet 10 may be held directly by rails 21 placed on the structure 1. Alternatively, the sheet 10 may be fixed to the structure 1 with an adhesive tape, a hook and loop fastener or the like. Alternatively, any other known means capable of holding the sheet 10 for the structure 1 may be used.

[0060] As illustrated in FIG. 1, the sheet 10 is provided with magnets 12. The magnets 12 are arranged at an upper end part of the sheet 10. The attracting force of the magnets 12 fixes the upper end part of the sheet 10 to the shutter curtain 4. The magnets 12 may be fixed to the sheet 10 beforehand, or alternatively, the sheet 10 may be provided with pockets and the magnets may be placed in the pockets when the sheet 10 is placed. Attraction of the sheet 10 toward the shutter curtain 4 by the magnets 12 prevents the sheet 10 from hanging down. As a result, the upper end of the sheet 10 can be held above a target water level.

[0061] The means for holding the sheet 10 on the shutter curtain 4 is not limited to the magnets 12. For example, an adhesive tape, a hook and loop fastener, suction cups, or the like may be used to fix the sheet 10 to the shutter curtain 4.

[0062] The sheet 10 has a length in the opening/closing direction longer than that of the predetermined area 41 of the shutter curtain 4. The lower end part in the vertical direction of the sheet 10 can thus be hung down onto the floor 8 and along the floor 8 in a state in which the sheet 10 is held by the holding parts 20. The sheet 10 is placed in a state in which the lower end part in the vertical direction of the sheet 10 extends along the floor 8 toward the exterior. In other words, the sheet 10 is placed so that the lower end part in the vertical direction and the floor 8 are opposed to each other and that the sheet 10 is gradually separated from the shutter curtain 4 toward the end of the lower end part. Herein, the lower end part in the vertical direction of the sheet 10 that extends along the floor 8 in a state in which the sheet 10 is held by the holding parts 20 will be referred to as a "sheet lower part 13".

[0063] In the present embodiment, the pressing members 16 are placed on the sheet lower part 13. The pressing members 16 are adapted to press the sheet 10 toward the structure 1, and press the sheet 10 toward the floor 8, for example. As illustrated in FIG. 1, the pressing members 16 are continuously arranged along the width direction of the opening 2 on the sheet lower part 13. The pressing members 16 may be arranged without gaps therebetween or may be arranged with predetermined gaps between adjacent pressing members 16. The pressing members 16 preferably have a rod-like or a plate-like shape. The pressing members 16 according to the present embodiment are flat bars having a plate-like shape. The pressing members 16 are made of metal, for example, with a mass and a density that can press the sheet lower part 13 toward the floor 8 against buoyancy. The pressing members 16 are placed on the sheet lower part 13 after the sheet lower part 13 is placed along the floor 8.

[0064] As illustrated in FIGS. 1 and 3, the pressing members 16 are arranged near the lower end of the shutter curtain 4, that is, at a position where the sheet 10 is bent between the part along the shutter curtain 4 and the part along the floor 8. As a result, the sheet 10 can be kept in close contact with the floor 8 near the lower end of the shutter curtain 4.

[0065] When the exterior water level is increased as a result of a flood, an unexpectedly heavy downpour, or the like, the sheet lower part 13 first comes in contact with water. The sheet lower part 13 is pressed against the floor 8 by the water pressure and comes in close contact with the floor 8. This prevents ingress of water through between the sheet lower part 13 and the floor 8. In addition, since the sheet lower part 13 is pressed against the floor 8 by the pressing members 16, ingress of water through gaps between the sheet lower part 13 and the floor 8 can be more securely prevented even when the water level is low. The pressing members 16 in the present embodiment are continuously provided along the width direction of the opening 2, that is, along the circumference of the opening 2. In the present embodiment, multiple pressing members 16 are arranged continuously along the width direction of the opening 2. This prevents gaps to be caused between the sheet lower part 13 and the floor 8. The pressing members 16 can prevent the sheet lower part 13 from floating due to a water flow or the like. The sheet 10 can cover the predetermined area 41 together with part of the floor 8 adjacent to the predetermined area 41 as a result of the water pressure.

[0066] Furthermore, as shown by a white arrow in FIG. 2, part of the sheet 10 covering the shutter curtain 4, the guide rails 5, and the wall faces 3a and 3b is pressed against the shutter curtain 4, the guide rails 5, and the wall faces 3a and 3b by the water pressure. This allows the sheet 10 to cover the predetermined area 41 of the shutter curtain 4 together with parts of the guide rails 5 and the wall faces 3a and 3b adjacent to the predetermined area 41. The sheet 10 comes into close contact with the shutter curtain 4, the guide rails 5, the wall faces 3a and 3b, and the like as a result of being pressed by the water pressure and can thus prevent water from entering between the sheet 10 and the shutter curtain 4, the guide rails 5, and the wall faces 3a and 3b.

[0067] The sheet 10 can also prevent ingress of water into the interior through gaps between the shutter curtain 4 and the guide rails 5 and gaps between the guide rails 5 and the wall faces 3a and 3b by closing the gaps as a result of the water pressure. The sheet 10 can also prevent ingress of water into the interior through gaps between adjacent slats 4a and 4a by closing the gaps. Furthermore, the sheet 10 can prevent ingress of water into the interior through gaps between the shutter curtain 4 and the floor 8 by closing the gaps between the predetermined area 41 of the shutter

curtain 4 and part of the floor 8 adjacent to the predetermined area 41 as a result of the water pressure.

[0068] Since the sheet 10 is pressed against the shutter curtain 4 and the like by the water pressure, the adhesion to the shutter curtain 4 and the like increases and the closing of the gaps is enhanced as the water level increases. The sheet 10 is thus increased in watertightness as the water level increases and can thus properly prevent ingress of water to the interior side.

[0069] Furthermore, since the sheet 10 is held by the holding parts 20 in a slack state, the sheet 10 can readily be brought into close contact with the shutter curtain 4, the guide rails 5 and the like by the water pressure as the water level increases. Moreover, the slack allows the sheet 10 to be properly deformed and bent to match with the shapes of gaps such as gaps between the shutter curtain 4 and the guide rails 5 to readily and properly close the gaps.

[0070] In terms of enhancing the waterproof property, the pressing members 16 are preferably placed on lower ends 15a of parts 15 of the sheet 10 covering the wall faces. The sheet 10 according to the present embodiment covers the predetermined area 41, the part of the floor 8 adjacent to the predetermined area 41 together with the parts of the wall faces 3a and 3b adjacent to the predetermined area 41 and opposed to each other in the width direction of the opening 2. The length in the opening/closing direction of the parts 15 of the sheet 10 covering the wall faces is longer than that of the holding parts 20. The parts 15 covering the wall faces can cover the wall faces 3a and 3b together with the floor 8 in a state in which the sheet 10 is held by the holding parts 20. The lower ends 15a of the parts 15 covering the wall faces are overlaid on the sheet lower part 13.

[0071] Since the parts 15 covering the wall faces cover the wall faces 3a and 3b together with the floor 8, ingress of water through corners A where the floor 8 and the wall faces 3a and 3b intersect is prevented. In addition, since the pressing members 16 are placed on the lower ends 15a of the parts 15 covering the wall faces, ingress of water through the corners A is further prevented.

[0072] In terms of enhancing the waterproof property, the pressing members 16 are preferably arranged continuous in the width direction of the opening 2 with ends of the pressing members 16 in contact with those of adjacent pressing members 16. In this manner, gaps between the sheet lower part 13 and the floor 8 can further be reduced. Furthermore, the pressing members 16 are preferably provided continuously from one end to the other in the width direction of the opening 2. For example, as illustrated in FIG. 4, the pressing members 16 are preferably arranged from one wall face 3a to the other wall face 3b continuously and with ends in contact with each other.

[0073] The pressing members 16 at the ends in the width direction of the opening 2 are preferably placed to press the parts 15 of the sheet 10 covering the wall faces against the wall faces 3a and 3b with the ends thereof. For example, the pressing member 16 positioned closest to the wall face 3b is preferably placed to press the sheet 10 against the wall face 3b with the end thereof on the side of the wall face 3b. This can reduce gaps between the sheet 10 and the wall faces 3a and 3b and prevent ingress of water to the interior.

[0074] Although multiple pressing members 16 are arranged on the sheet lower part 13 in the present embodiment, the number of pressing members 16 may be one. For example, one pressing member 16 having a length equal to the total length of the multiple pressing members 16 may be used to press the sheet lower part 13 against the floor 8.

[0075] An instruction in the form of text or illustration may be presented on the sheet 10. For example, a list of components included in the waterproof device 1-1 for an opening, the installation method and the installation procedures may be printed on the sheet 10 to allow prompt installation work in case of emergency such as a flood.

[0076] The pressing members 16 may be ballast (sandbags) instead of plate-like flat bars. The ballast is contained in the sheet 10, for example. The ballast is contained between layers of a double-layered sheet 10, for example, but the ballast is not limited thereto and may be fixed to the surface of the sheet 10 by adhesion or sewing. The ballast may be arranged beforehand at the sheet lower part 13. The placement positions of the ballast can be the positions represented by dashed ellipses in FIG. 1, that is, the same positions as those where the flat bars are placed.

[0077] Although the lower ends 15a of the parts 15 covering the wall faces are separated from the sheet lower part 13 in the present embodiment, the lower ends 15a are not limited thereto. For example, the lower ends 15a of the parts 15 covering the wall faces may be integrated with the sheet lower part 13. In this case, parts connecting the lower ends 15a and the sheet lower part 13 are preferably folded and overlaid on the sheet lower part 13 when the sheet 10 is placed over the opening 2. The pressing members 16 are preferably placed on the folded portions overlaid on the sheet lower part 13 to press the folded parts against the floor 8.

[First Modified Example of First Embodiment]

[0078] A first modified example of the first embodiment will be described. FIG. 5 is a perspective view illustrating a state in which a pressing member according to the first modified example of the first embodiment is placed; and FIG. 6 is a sectional view illustrating a state in which the pressing member according to the first modified example of the first embodiment is placed. The pressing member 16 according to the present modified example is different from the pressing member 16 in the first embodiment in that the pressing member 16 according to the present modified example can be deformed to match with the shape of the structure 1.

[0079] As illustrated in FIGS. 5 and 6, the pressing member 16 includes a body 16a and a deforming part 16b.

[0080] The body 16a is a flat bar similar to the pressing member 16 of the first embodiment, and can be made of a material having a relatively great specific gravity or a material having a high rigidity such as metal. The deforming part 16b can be subjected to deformation such as elastic deformation and plastic deformation, and is made of rubber, for example. The deforming part 16b is formed in a plate-like shape, and a face of the body 16a and a face of the deforming part 16b are fixed by an adhesion or the like. As illustrated in FIG. 6, the pressing member 16 is placed so that the face (hereinafter referred to as a "placement face") 16e of the deforming part 16b opposite to the face facing the body 16a faces the sheet 10.

[0081] When the pressing member 16 is placed on the sheet lower part 13, the pressing member 16 is placed on the sheet lower part 13 with the placement face 16e facing downward. The deforming part 16b of the present embodiment is deformed to match with the shape of the floor 8 by the weight of the pressing member 16 itself when placed on the sheet lower part 13. For example, when the floor 8 is irregular as illustrated in FIG. 6, the deforming part 16b is deformed to match with the irregularity of the floor 8 by the weight of the pressing member 16 itself. The deforming part 16b deforms into a concave shape to match with a convex shape of the floor 8 and deforms into a convex shape to match with a concave shape of the floor 8. As a result, when the sheet lower part 13 is placed on the irregular floor 8, the pressing member 16 can press the sheet lower part 13 against the concaves and convexes of the floor 8 to reduce gaps between the sheet lower part 13 and the floor 8.

[0082] When the floor 8 is curving, the pressing member 16 can be deformed to match with the curving shape by its weight. The pressing member 16 according to the present modified example can thus be easily placed, prevent the sheet lower part 13 from floating from the floor 8, and prevent ingress of water into the interior.

[0083] Note that the deforming part 16b may be deformed to match with the shape of a surface such as the floor 8 by being pressed against the surface by a user and maintain the shape even after the pressing force of the user is no longer applied thereto. For example, the deforming part 16b may be made of a material that can maintain the shape by its weight even after the pressing force of the user is no longer applied.

[0084] Although part of the pressing member 16 is the deforming part 16b in the present modified example, the entire pressing member 16 may alternatively be a deforming part 16b.

[Second Modified Example of First Embodiment]

[0085] A second modified example of the first embodiment will be described. FIG. 7 is an explanatory view of a gap at a corner; FIG. 8 is a perspective view illustrating a state in which a pressing member according to the second modified example of the first embodiment is placed; and FIG. 9 is a sectional view illustrating a state in which the pressing member according to the second modified example of the first embodiment is placed. The pressing member 16 according to the present modified example is different from the pressing member 16 according to the first modified example of the first embodiment in that a deforming part is provided at an end thereof.

[0086] As illustrated in FIG. 7, a gap is likely to be caused at a corner A where the wall face 3a, 3b intersects with the floor 8 between the corner A and the part 15 covering the wall face of the sheet 10. Although the gap becomes smaller when the water pressure is applied to the sheet 10 and the sheet 10 is pressed toward the corner A, ingress of water through the gap at the corner A may not be negligible if the water level is low and the water pressure applied to the sheet 10 is not sufficient.

[0087] The pressing member 16 according to the present modified example has the deforming part at the end thereof, which can reduce the gap at the corner A to prevent ingress of water. As illustrated in FIGS. 8 and 9, the pressing member 16 has an end deforming part 16c. The end deforming part 16c is provided at an end in the longitudinal direction of the pressing member 16 and is opposed to the wall face 3a, 3b in the width direction of the opening 2 when placed on the sheet lower part 13. The end deforming part 16c can be subjected to deformation such as elastic deformation and plastic deformation, and is made of rubber, for example. The end deforming part 16c can be deformed to match with the shape of the wall face 3a, 3b by being pressed against the wall face 3a, 3b. The end deforming part 16c is formed in a rectangular plate-like shape, and fixed to end faces of the body 16a and the deforming part 16b by an adhesion or the like. Note that the deforming part 16b and the end deforming part 16c may be integrated.

[0088] The pressing member 16 having the end deforming part 16c is placed on the sheet lower part 13 so that the face (hereinafter referred to as a "pressing face") 16f of the end deforming part 16c opposite to the face facing the body 16a faces the wall face 3a, 3b and that the placement face 16e faces the floor 8. The pressing member 16 is preferably placed so that the end deforming part 16c presses the sheet 10 against the wall face 3a, 3b. Since the end deforming part 16c is pressed against the wall face 3a, 3b and deformed to match with the shape of the wall face 3a, 3b, ingress of water through a gap between the sheet 10 and the wall face 3a, 3b and a gap between the sheet 10 and the corner A can be prevented.

[0089] As illustrated in FIG. 9, the end deforming part 16c has a corner portion 16d. The pressing member 16 having the corner portion 16d can reduce the gap at the corner A to prevent ingress of water. The corner portion 16d is a corner

portion matching with the corner A when placed on the sheet lower part 13, that is, a corner portion between the lower face and the end face of the pressing member 16. The shape of the corner portion 16d matches with that of the corner A. In the present embodiment, the corner A has a right angle and the corner portion 16d is correspondingly formed to have a right angle. The pressing member 16 is placed with the sheet 10 between the corner portion 16d and the corner A. When the pressing member 16 is placed so that the end deforming part 16c is pressed against the wall face 3a, 3b, the corner portion 16d presses the sheet 10 against the corner A. As a result, the gap between the corner A and the sheet 10 is reduced and ingress of water through the corner A can be properly prevented even at a low water level.

[0090] For placing the end deforming part 16c in a manner being pressed against the wall face 3a, 3b, the total length of the pressing members 16 may be greater than the width W of the opening 2. Thus, when the pressing members 16 are arranged continuously from one end to the other in the width direction of the opening 2 as illustrated in FIG. 4, the end deforming part 16c is compressed. As a result, the end deforming part 16c presses the sheet 10 against the wall face 3a, 3b and the corner A, which can enhance the adhesion.

[0091] There may be no wall face against which the sheet 10 can be pressed depending on the structure of the shutter. FIG. 10 is an explanatory view of a placement method in which a sheet is pressed against a guide rail by a pressing member. As illustrated in FIG. 10, the holding part 20 may be attached to the guide rail 5. In this case, the waterproofing property can be enhanced by pressing the sheet 10 against the guide rail 5 by the pressing member 16.

[0092] As illustrated in FIG. 10, the pressing member 16 is placed on the sheet lower part 13 so that the body 16a and the end deforming part 16c press the sheet 10 against the guide rail 5. As a result, a gap between the sheet 10 and the guide rail 5 is reduced. Furthermore, a gap at a corner where the guide rail 5 and the floor 8 intersect is reduced. It is therefore possible to make gaps near the floor 8 as small as possible and prevent ingress of water at a low water level.

[0093] FIG. 11 is a diagram illustrating another example of the pressing member pressing the sheet against the guide rail. The pressing member 16 illustrated in FIG. 11 has deforming parts 16g protruding in a direction perpendicular to the longitudinal direction of the body 16a. The deforming parts 16g can be subjected to deformation such as elastic deformation and plastic deformation, and are made of rubber, for example. The deforming parts 16g are provided on side faces at the ends of the pressing member 16. The deforming parts 16g may be partial protrusions of the end deforming parts 16c or the deforming parts 16b. The pressing member 16 is placed so that the deforming parts 16g press the sheet 10 against the guide rails 5. Alternatively, in the pressing member 16 illustrated in FIG. 11, the body 16a may be an angle steel instead of the flat bar.

[Third Modified Example of First Embodiment]

[0094] As illustrated in FIG. 12, the ends in the width direction of the sheet lower part 13 may be subjected to end processing beforehand according to the width of the opening 2. FIG. 12 is a diagram illustrating an end in the width direction of a sheet according to the third modified example of the first embodiment. When the sheet lower part 13 has a width larger than that of the opening 2, both ends 13a in the width direction need to be properly processed so as to bring the sheet lower part 13 in close contact with the floor 8. If the ends 13a of the sheet lower part 13 are attempted to be applied to an arrangement of a site in a state in which the ends 13a of the sheet lower part 13 is not subjected to any processing, creases or the like may be caused at folding lines or the like of the sheet 10. In this case, water is likely to enter through gaps due to the caused creases or the like, which may lead to degradation in the water stopping performance. Furthermore, fitting of the sheet 10 may vary depending on the contractor, which may affect the water stopping performance.

[0095] In the present modified example, the ends 13a of the sheet lower part 13 are folded beforehand. The ends 13a are fixed in a state folded toward the lower face of the sheet lower part 13, that is, toward the side opposed to the floor 8 when the sheet 10 is placed. The fixing method may be a method such as adhesion with a double-sided tape or sewing. As a result, the sheet lower part 13 can be placed on the floor 8 in a state without any creases or the like. The width of the sheet lower part 13 is equal to the width of the opening 2 in a state in which the ends 13a are folded. As a result, gaps are prevented from being caused between the sheet lower part 13 and the wall faces 3a and 3b. Note that the ends 13a of the sheet lower part 13 may be folded toward the upper face of the sheet lower part 13.

[0096] Since the sheet lower part 13 is in a folded state to fit an arrangement of a corner, attachment of the sheet 10 at the site is facilitated. There are advantages that standard attachment is possible, that the time for the attachment can be shortened, and that the water stopping performance is increased.

[0097] Alternatively, the ends of the sheet lower part 13 may be cut beforehand according to the width of the opening 2 instead of folding the ends 13a of the sheet lower part 13. In this case, if the wall faces 3a and 3b are irregular, the ends of the sheet lower part 13 may be cut into shapes to match with the irregularity. The ends 13a of the sheet lower part 13 can be subjected to other end processing so as to reduce the adjustment work or eliminate the need for the adjustment work at the site. Thus, other means for shaping the ends 13a to match with the shapes or the irregularity of the wall faces 3a and 3b, the guide rails 5, the rails 21, and the like may be adopted.

[Fourth Modified Example of First Embodiment]

[0098] A fourth modified example of the first embodiment will be described. FIG. 13 is a diagram illustrating a sheet according to the fourth modified example of the first embodiment. The placement positions of the pressing members 16 may be presented on the sheet 10. This presentation may be belt-shaped marks.

[0099] Note that the method of pressing the sheet lower part 13 against the floor 8 may be performed by using the magnetic force. For example, a steel plate or the like may be buried in the floor 8 beforehand, and the sheet lower part 13 can be pressed toward the steel plate by the magnetic force of a magnet.

[0100] Furthermore, marks 17 that serves as guides for positioning in the opening/closing direction may be presented on the sheet 10. The marks 17 indicate a lower end of a range along the shutter curtain 4 of the sheet 10 held by the holding parts 20. Specifically, the marks 17 indicate the position at the sheet 10 corresponding to the lower end of the shutter curtain 4. As a result of positioning of the sheet 10 in the opening/closing direction based on the marks 17, insufficient covering with the sheet 10 at the lower end thereof can be prevented.

[Fifth Modified Example of First Embodiment]

[0101] A fifth modified example of the first embodiment will be described. FIG. 14 is a diagram illustrating a waterproof device 1-1 for an opening according to the fifth modified example of the first embodiment. A pressing member 18 according to the present modified example is water absorbent. The pressing member 18 is a rod-like or plate-like member, for example, and has a length corresponding to the width of the sheet lower part 13. The pressing member 18 can thus press the sheet lower part 13 from one end to the other in the width direction thereof to prevent floating of the sheet 10. The pressing member 18 is attached beforehand to the sheet 10.

[0102] The pressing member 18 is made of a material that absorbs water such as sponge, felt, or cloth. Such materials are easily folded with the sheet 10 and lightweight in a dry state, which increases convenience in storage, transportation, installation and the like. Note that the material for the pressing member 18 is not limited to those mentioned, but any other known material may be used.

[0103] In terms of preventing floating of the edge of the sheet lower part 13, the sheet lower part 13 is preferably edged with the pressing member 18. The pressing member 18 is arranged on an edge 13b at the most exterior side of the sheet lower part 13, for example. FIG. 15 is a diagram illustrating an example of arrangement of the pressing member 18. The pressing member 18 may also be arranged on edges 13c at the ends in the width direction in addition to the edge 13b at the most exterior side. The pressing member 18 illustrated in FIG. 15 has a first part 18a extending along the edge 13b at the most exterior side and second parts 18b extending along the edges 13c at the ends in the width direction. The first part 18a and the second parts 18b are formed in an integrated manner. The second parts 18b are arranged within a predetermined range at the leading ends of the edges 13c at the ends in the width direction. Since the pressing member 18 is arranged to press the corners of the sheet lower part 13 in this manner, floating of the sheet lower part 13 is effectively prevented.

[Sixth Modified Example of First Embodiment]

[0104] A sixth modified example of the first embodiment will be described. In the present modified example, part of the sheet 10 is between the shutter curtain 4 and the floor 8 and pressed against the floor 8 by the shutter curtain 4. As a result, floating of the sheet lower part 13 can be prevented by using the shutter curtain 4 as a weight. FIGS. 16, 17 and 18 are sectional view illustrating sheets 10 according to the present modified example.

[0105] A sheet 10 illustrated in FIG. 16 has a part at the leading end of the sheet lower part 13 folded toward the interior. The sheet 10 is placed so that a portion 13e closer to the leading end than a bent portion 13d of the sheet lower part 13 extends further into the interior than a seat plate 4b of the shutter curtain 4. For example, the portion 13e closer to the leading end is inserted between the seat plate 4b and the floor 8 in a state in which the shutter curtain 4 is moved slightly in the opening direction from the fully closed position. Thereafter, the shutter curtain 4 is moved to the fully closed position to press the portion 13e closer to the leading end against the floor 8.

[0106] Since the portion 13e closer to the leading end is pressed by the shutter curtain 4 in this manner, floating of the sheet lower part 13 is prevented. Furthermore, the sheet lower part 13 is between the shutter curtain 4 and the floor 8 to close gaps between the shutter curtain 4 and the floor 8. As a result, ingress of water through gaps between the shutter curtain 4 and the floor 8 is prevented.

[0107] A sheet 10 illustrated in FIG. 17 includes a first sheet 25 and a second sheet 26 connected to each other. The first sheet 25 is a sheet opposed to the shutter curtain 4 and extending in the opening/closing direction. The second sheet 26 is a sheet opposed to the floor 8. The first sheet 25 is connected to the upper face of the second sheet 26. A part 26a of the second sheet 26 on an exterior side of the first sheet 25 serves as the sheet lower part 13. A part 26b of the second sheet 26 on an interior side of the first sheet 25 is positioned between the shutter curtain 4 and the floor 8.

[0108] A sheet 10 illustrated in FIG. 18 includes a first sheet 27 and a second sheet 28 connected to each other. The first sheet 27 has a part 27b opposed to the shutter curtain 4 and a part 27c opposed to the floor 8. The part 27c opposed to the floor 8 serves as the sheet lower part 13. The first sheet 27 and the second sheet 28 are connected in a manner that an end 27a and an end 28a in the length direction thereof overlap with each other. Specifically, the leading end 27a of the sheet lower part 13 of the first sheet 27 and the leading end 28a of the second sheet 28 overlap with each other. The second sheet 28 is connected to the lower face of the first sheet 27.

[0109] The second sheet 28 is positioned to be opposed to the floor 8 so that the end 28a overlapping with the first sheet 27 is positioned on the exterior side of the shutter curtain 4 and the other end 28b is positioned on the interior side of the shutter curtain 4. The second sheet 28 is between the shutter curtain 4 and the floor 8, and pressed against the floor 8. Since the first sheet 27 and the second sheet 28 are connected in a state overlapping with each other, floating of the ends 27a and 28a on the exterior side is prevented.

[Seventh Modified Example of First Embodiment]

[0110] A seventh modified example of the first embodiment will be described. While the opening/closing member that opens and closes the opening 2 is the shutter curtain 4 in the first embodiment, the opening/closing member is not limited thereto. For example, the opening/closing member may be a swinging hinged door. FIG. 19 is a diagram illustrating a waterproof device 1-2 for an opening placed on a hinged door. A door frame 29 is arranged on the wall faces 3a and 3b of the structure 1. A door 30 is turnably supported by the door frame 29 with a hinge 31. A sheet 10 is placed on the exterior side of the door 30. Both ends of the sheet 10 are held by holding parts 20 similar to the holding parts 20 in the first embodiment, for example. In a simpler manner, the sheet 10 may be held by the structure 1 with an adhesive tape, a hook and loop fastener, or the like. The sheet 10 covers the door 30, the door frame 29, the hinge 31, and the wall faces 3a and 3b all together. As a result, ingress of water through gaps between the door 30 and the door frame 29, gaps between the door 30 and the floor 8, and the like is prevented.

[0111] Alternatively, the opening/closing member may be of a sliding type such as an automatic door. FIG. 20 is a diagram illustrating a waterproof device 1-3 for an opening placed on an automatic door. FIG. 20 illustrates a double sliding automatic door having two doors 34 opening and closing in the width direction of the opening 2. A doorjamb 33 is connected to an end of each of side walls 32 that are part of the structure 1. The doors 34 are positioned on the interior side of the doorjamb 33. The sheet 10 is held by the doorjamb 33 via the holding parts 20. The sheet 10 covers the pair of doors 34 together with the doorjamb 33. As a result, ingress of water through gaps between the doors 34 and the doorjamb 33, gaps between the doors 34 and the floor, and the like is prevented.

[0112] Alternatively, the opening/closing member may be a grille shutter. FIG. 21 is a diagram illustrating an example of a method for attaching a sheet 10 on a grille shutter 44. The grille shutter 44 includes multiple pipes 45 arranged at predetermined intervals and connected to one another. The sheet 10 is held by a pipe 45 via a hook 35. An attachment hole 19 is formed in the sheet 10, and reinforced by an eyelet. An end of the hook 35 having an S-shape is inserted into the attachment hole 19, and the other end thereof is hooked on the pipe 45. In this manner, the sheet 10 can be easily placed on the grille shutter 44.

[0113] For placing the sheet 10 on the grille shutter 44, an auxiliary member such as a plate member or a net-like member may be placed between the sheet 10 and the grille shutter 44. The auxiliary member covers a predetermined area of the grille shutter 44. Since the auxiliary member supports the sheet 10 against the water pressure, the sheet 10 is prevented from projecting toward the interior side from between adjacent pipes 45.

[0114] Other examples of the opening/closing member to which the waterproof device 1-1 for an opening can be applied include a member including one or more panels, sheets, or nets connected in the opening/closing direction, and a member combining slats, panels, pipes, sheets, nets, and the like as appropriate in addition to those using slats and pipes.

[Eighth Modified Example of First Embodiment]

[0115] An eighth modified example of the first embodiment will be described. A pressing member may be placed to press the sheet 10 against the wall faces 3a and 3b in addition to pressing the sheet 10 against the floor 8. FIG. 22 is a diagram illustrating a pressing member according to the eighth modified example of the first embodiment. As illustrated in FIG. 22, the pressing member 50 according to the present modified example includes a body 50a and a deforming part 50b. For easier handling, the pressing member 50 is preferably made of a lightweight material. The body 50a is a flat bar, and can be made of a rigid material. The deforming part 50b can be subjected to deformation such as elastic deformation and plastic deformation, and is made of rubber, for example. The deforming part 50b is formed in a plate-like shape, and a face of the body 50a and a face of the deforming part 50b are fixed by adhesion or the like. The pressing member 50 is placed so that a placement face 50c of the deforming part 50b opposite to the face facing the body 50a faces the sheet 10.

[0116] The pressing member 50 is pressed against the wall faces 3a and 3b by a pressing device 51, for example. The pressing device 51 includes a body 52 and a fixing part 53. The body 52 is a member having a right triangular shape in plan view. In a state in which a side 52a at the right angle of the body 52 presses the pressing member 50 toward the wall face 3a, 3b, the other side at the right angle of the body 52 is fixed to the floor 8 by the fixing part 53. The fixing part 53 fixes the body 52 to the floor 8 by a combination of a bolt and a nut, for example. The pressing member 50 and the pressing device 51 according to the present modified example can serve as a holding part holding the sheet 10.

[0117] Note that the means for pressing the pressing member 50 toward the wall face 3a, 3b is not limited to that of the example. For example, the pressing member 50 may be pressed toward the wall face 3a, 3b by a tension rod. Alternatively, the pressing member 50 may be attracted toward the wall face 3a, 3b by the magnetic force.

[Second Embodiment]

[0118] A second embodiment will be described with reference to FIG. 23. In the second embodiment, components having the same functions as those in the embodiment described above will be designated with the same reference numerals and redundant description will not be repeated. FIG. 23 is a diagram illustrating a supporting member of a waterproof device 2-1 for an opening according to the present embodiment. The waterproof device 2-1 according to the present embodiment is different from the waterproof devices 1-1, 1-2, and 1-3 in the first embodiment in that a supporting member that supports an opening/closing member is provided. The shutter device is designed to have a strength satisfying wind pressure resistant performance, but the water pressure applied to the shutter device in case of a flood due to an unexpected heavy downpour or the like is much higher than the wind pressure. Thus, when the sheet 10 is placed to stop water, it is preferable that the shutter curtain 4 can be supported against the force due to the water pressure.

[0119] As illustrated in FIG. 23, attachment holes 36 are provided in the floor 8 on the interior side of the shutter curtain 4. The attachment holes 36 are arranged along the thickness direction of the shutter curtain 4. A supporting member 37 has a contact part 37a and protrusions 37b to be engaged with the attachment holes 36. The contact part 37a comes into contact with the shutter curtain 4 to prevent deformation in the thickness direction of the shutter curtain 4 (hereinafter simply referred to as the "thickness direction"). The supporting member 37 has a triangular shape, and the contact part 37a is one side thereof. The protrusions 37b are provided on another side and protrude outward. The supporting member 37 has a right triangular shape, for example, in which case, the side of the contact part 37a and the side with the protrusions 37b are perpendicular to each other. The protrusions 37b are inserted into the attachment holes 36 to restrict movement of the supporting member 37 in the thickness direction.

[0120] The supporting member 37 is positioned by the protrusions 37b and the attachment holes 36 and placed to be opposed to the seat plate 4b of the shutter curtain 4, for example, in the thickness direction. When the shutter curtain 4 is bent toward the interior because of the water pressure applied to the shutter curtain 4 from the exterior, the seat plate 4b comes in contact with the contact part 37a of the supporting member 37. As a result, further deformation of the seat plate 4b is prevented. As a result of preventing deformation of the seat plate 4b, deformation of slats 4a connected to the seat plate 4b is also prevented. Thus, the supporting member 37 supports the shutter curtain 4 against the force due to the water pressure from the exterior to prevent deformation of the shutter curtain 4.

[0121] The supporting member 37 can prevent deformation of the shutter curtain 4 and prevent the shutter curtain 4 getting out of the guide rails 5 by supporting the seat plate 4b. Furthermore, the supporting member 37 can prevent ingress of water caused by deformation of the shutter curtain 4. Provision of the supporting member 37 allows the waterproof device 2-1 for an opening to be also applied to a large opening 2 or an opening for which a relatively weak opening/closing member is provided.

[First Modified Example of Second Embodiment]

[0122] A first modified example of the second embodiment will be described. A supporting member according to the present modified example is different from the supporting member 37 of the second embodiment in that the supporting member is stored in the floor 8. FIG. 24 is a diagram illustrating a supporting member 38 according to the present modified example; and FIG. 25 is a diagram illustrating another supporting member 40 according to the present modified example.

[0123] As illustrated in FIG. 24, the supporting member 38 is stored in a recess 8a formed in the floor 8. The supporting member 38 has a triangular shape and is connected to a bottom face 8b of the recess 8a with a hinge or the like. The supporting member 38 can turn around the axis of the hinge and can be switched between a laid state to be accommodated inside the recess 8a and an upright state protruding from the recess 8a. A contact part 38a of the supporting member 38 in the upright state is opposed to the shutter curtain 4 in the thickness direction. When the supporting member 38 is stored in the recess 8a, a lid 39 is placed over the recess 8a.

[0124] The supporting member 40 illustrated in FIG. 25 is also stored in a recess 8a similarly to the supporting member 38. The supporting member 40 has a cylindrical shape, and is connected to a bottom face 8b of the recess 8a with a

hinge or the like. The supporting member 40 can turn around the axis of the hinge and can be switched between a laid state to be accommodated inside the recess 8a and an upright state protruding from the recess 8a. The supporting member 40 in the upright state is opposed to the shutter curtain 4 in the thickness direction. When the supporting member 40 is stored in the recess 8a, a lid 41 is placed over the recess 8a.

[0125] With the supporting member 38, 40 according to the present modified example, the supporting member 38, 40 need not be carried, which can shorten the time for installation. Furthermore, since the floor 8 is kept flat by the lid 39, 41, there is no hindrance in passing over the floor 8.

[Second Modified Example of Second Embodiment]

[0126] A second modified example of the second embodiment will be described. A supporting member according to the present modified example is different from the supporting member 38, 40 of the first modified example of the second embodiment in that the supporting member is positioned on the exterior side. FIG. 26 is a diagram illustrating a supporting member 42 according to the present modified example; and FIG. 27 is a diagram illustrating another supporting member 43 according to the present modified example.

[0127] The supporting member 42 illustrated in FIG. 26 is a wire or any other string-like member, and connects the floor 8 and the seat plate 4b. An end of the supporting member 42 is connected to the seat plate 4b, and the other end thereof is connected to the floor 8 on the exterior side of the seat plate 4b. As a result, the supporting member 42 can support the shutter curtain 4 against the force applied by the water pressure from the exterior to prevent the shutter curtain 4 from bending toward the interior.

[0128] The supporting member 43 illustrated in FIG. 27 is a hook member, and connects the floor 8 and the seat plate 4b. The supporting member 43 is a bent member having a U-shape or a J-shape. One end of the supporting member 43 is inserted in an attachment hole formed in the floor 8 on the exterior side of the seat plate 4b, and the other end thereof is inserted in a receiving part of the seat plate 4b. The receiving part is a recess or a hole formed in the seat plate 4b and engages with the supporting member 43. The supporting member 43 can support the shutter curtain 4 against the force applied by the water pressure from the exterior to prevent the shutter curtain 4 from bending toward the interior.

[Third Modified Example of Second Embodiment]

[0129] A third modified example of the second embodiment will be described. A supporting member of the present modified example is different from the supporting members 38, 40, 42 and 43 of the first and second modified examples of the second embodiment in that the supporting member is a recess or protrusion formed on/in the floor 8. FIG. 28 is a diagram illustrating a supporting member 46 according to the present modified example; and FIG. 29 is a diagram illustrating another supporting member 47 according to the present modified example.

[0130] The supporting member 46 illustrated FIG. 28 is a protrusion formed on the floor 8. The supporting member 46 is positioned on the interior side of the seat plate 4b of the shutter curtain 4. The supporting member 46 is opposed to the seat plate 4b in the thickness direction. The supporting member 46 can support the shutter curtain 4 against the force applied by the water pressure from the exterior to prevent the shutter curtain 4 from bending toward the interior.

[0131] The supporting member 47 illustrated FIG. 29 is a groove formed in the floor 8. The groove 47 is positioned underneath the shutter curtain 4 in the vertical direction and extends in the width direction of the opening 2. The guide rails 5 are preferably provided down to inside of the groove 47. The groove 47 can be closed with a lid 48. For preventing ingress of water, the lid 48 is removed from the groove 47 and the seat plate 4b of the shutter curtain 4 is accommodated in the groove 47. As a result, the groove 47 can support the shutter curtain 4 against the force applied by the water pressure from the exterior to prevent the shutter curtain 4 from bending toward the interior.

[Fourth Modified Example of Second Embodiment]

[0132] A fourth modified example of the second embodiment will be described. A supporting member of the present modified example is different from the supporting members 38, 40, 42, 43, 46, and 47 of the first, second, and third modified examples of the second embodiment in that the supporting member is of an assembly type. FIG. 30 is a diagram illustrating a supporting member 49 according to the present modified example in an installed state; and FIG. 31 is a diagram illustrating the supporting member 49 according to the present modified example in a stored state.

[0133] As illustrated in FIGS. 30 and 31, the supporting member 49 has a body 49a, a contact part 49b, and a link part 49c. The body 49a is fixed to the floor 8. The contact part 49b comes into contact with the shutter curtain 4. The link part 49c connects the body 49a and the contact part 49b.

[0134] The contact part 49b is connected to one end of the body 49a, and the link part 49c is connected to the other end thereof. The body 49a and a base of the contact part 49b are connected and turnable relative to each other. In

addition, the body 49a and a base of the link part 49c are connected and turnable relative to each other. The contact part 49b has a connection hole 49d. The link part 49c also has a connection hole 49e formed in a leading end thereof. The supporting member 49 can have a truss structure by connecting the connection hole 49d of the contact part 49b and the connection hole 49e of the link part 49c with connecting members such as a bolt and a nut. In this case, the contact part 49b preferably extends in the vertical direction. The body 49a is fixed to the floor 8 with the attachment holes 36 and the protrusions 37b of the second embodiment, for example.

[0135] The supporting member 49 of the present modified example can be stored in a compact manner by disconnecting the contact part 49b and the link part 49c. Furthermore, the truss structure in the installed state can support the shutter curtain 4 with sufficient strength.

[Third Embodiment]

[0136] A third embodiment will be described with reference to FIGS. 32 and 33. In the third embodiment, components having the same functions as those in the embodiments described above will be designated with the same reference numerals and redundant description will not be repeated. A waterproof device 3-1 for an opening according to the present embodiment is different from the waterproof devices 1-1, 1-2, 1-3, and 2-1 for an opening of the embodiments in a structure that a sheet 10 can more efficiently prevent leakage of water through corners where the floor 8 and the wall faces 3a and 3b intersect. FIG. 32 is a perspective view illustrating a main part of a sheet according to the third embodiment placed over an opening; and FIG. 33 is a development view of the sheet according to the third embodiment.

[0137] The sheet 10 according to the present embodiment covers the predetermined area 41 of the shutter curtain 4, part of the floor adjacent to the predetermined area 41, and parts of the wall faces 3a and 3b adjacent to the predetermined area 41 and opposed to each other in the width direction all together similarly to the sheet 10 of the first embodiment (see FIGS. 1 and 2). Note that water leakage is likely to be caused at a corner A illustrated in FIG. 32, that is, at corners A where the wall faces 3a and 3b intersect with the floor 8 in a state in which the sheet 10 is placed over the opening 2. If a gap is caused between the sheet 10 and the corner A, water will enter the interior through the gap. With the waterproof device 3-1 for an opening according to the present embodiment, the sheet 10 can be placed in a manner that an end 62a in the width direction of a part (a lower edge 62 to be described later) corresponding to the floor 8 and lower ends 60a of parts (side edges 60 to be described later) corresponding to the wall faces 3a and 3b overlap with each other. As a result, gaps are prevented from being caused between the corner A and the sheet 10, and water leakage is prevented.

[0138] Herein, the parts of the sheet 10 corresponding to the wall faces 3a and 3b will be referred to as "side edges 60". The side edges 60 are areas including parts opposed to the wall faces 3a and 3b in the width direction of the opening 2 in a state in which the sheet 10 is held by the holding parts 20. The side edges 60 also include parts extending from the parts opposed to the wall faces 3a and 3b, such as parts extending in the opening/closing direction.

[0139] In addition, the part of the sheet 10 corresponding to the floor 8 will be referred to as a "lower edge 62". The lower edge 62 includes a part opposed to the floor 8 and a part extending therefrom in a state in which the sheet 10 is held by the holding parts 20. As illustrated in FIG. 33, the sheet 10 has slits 61 formed between the lower ends 60a of the side edges 60 and the lower edge 62. The slits 61 are cut lines formed at the lower end of the sheet 10 and extending in the opening/closing direction. The length in the width direction of the lower edge 62 is equal to or shorter than the width of the opening 2.

[0140] As illustrated in FIG. 32, the side edges 60 are folded along the corners A, and the lower ends 60a of the side edges 60 are overlaid on the ends 62a in the width direction of the lower edge 62. As a result, the wall faces 3a and 3b and the floor 8 including the corners A can be covered together by the side edges 60. Thus, gaps are prevented from being caused between the corners A and the sheet 10. Furthermore, since the lower edge 62 and the lower ends 60a of the side edges 60 overlap with each other, the lower edge 62 and the side edges 60 can be brought in close contact to prevent ingress of water into the interior.

[0141] If the water level in the exterior increases and the water pressure applied to the sheet 10 is increased, the side edges 60 are pressed toward the corners A. As a result, the gaps between the sheet 10 and the corners A become smaller, and water ingress into the interior can further be prevented. In addition, if the water pressure increases, the lower ends 60a of the side edges 60 and the ends 62a in the width direction of the lower edge 62 come in close contact with each other to prevent water ingress into the interior. With the sheet 10 according to the present embodiment, the lower ends 60a of the side edges 60 and the ends 62a in the width direction of the lower edge 62 are separated by the slits 61, which can easily make the lower ends 60a and the ends 62a overlap with each other.

[0142] Although the lower ends 60a of the side edges 60 are overlaid on the lower edge 62 in the present embodiment, the ends 62a in the width direction of the lower edge 62 may alternatively be overlaid on the lower ends 60a of the side edges 60.

[First Modified Example of Third Embodiment]

[0143] A first modified example of the third embodiment will be described. FIG. 34 is a perspective view illustrating a main part of a sheet according to the first modified example of the third embodiment placed over an opening; and FIG. 35 is a development view of the sheet according to the first modified example of the third embodiment.

[0144] As illustrated in FIG. 35, slits 63 are formed diagonally in a manner separating each of lower corner portions of the sheet 10 into two triangles. The slits 63 result in tapered fins 62b projecting in the width direction of the lower edge 62 and tapered fins 60b projecting in the opening/closing direction of the side edges 60. The length from the tip of one fin 62b to the tip of the other fin 62b is longer than the width of the opening 2. Thus, the lower edge 62 can be folded along the corners A so that the fins 62b are raised from the floor 8 and the fins 62b can be made to extend along the wall faces 3a and 3b when the sheet 10 is placed over the opening 2. In addition, the fins 60b are provided below (in the closing direction) zip fasteners 11. Thus, the side edges 60 can be folded along the corners A and the fins 60b can be made to extend along the floor 8 when the sheet 10 is placed over the opening 2.

[0145] As illustrated in FIG. 34, the sheet 10 is placed so that the fins 60b of the side edges 60 overlap with the lower edge 62 and that the fins 62b of the lower edge 62 overlap with the side edges 60. In the present embodiment, the fins 60b are overlaid on the lower edge 62 and the fins 62b are overlaid on outer sides of the side edges 60 in the width direction. Thus, the fins 62b are hidden behind the side edges 60 when the placement of the sheet 10 over the opening 2 is completed. According to the sheet 10 according to the present modified example, the ends in the width direction of the lower edge 62 and the lower ends of the side edges 60 are placed to overlap with each other, which allows the lower edge 62 and the side edges 60 to cover the floor 8 and the wall faces 3a and 3b together, respectively, at the same time. Ingress of water through gaps between the corners A and the sheet 10 can thus be efficiently prevented.

[0146] Note that the overlap of the side edges 60 and the ends in the width direction of the lower edge 62 is not limited to that illustrated. For example, the lower edge 62 may be overlaid on the fins 60b and the fins 62b may be overlaid on the side edges 60 inside in the width direction.

[Second Modified Example of Third Embodiment]

[0147] A second modified example of the third embodiment will be described. FIG. 36 is a perspective view illustrating a main part of a sheet according to the second modified example of the third embodiment placed over an opening; and FIG. 37 is a development view of the sheet according to the second modified example of the third embodiment.

[0148] As illustrated in FIG. 37, the side edges 60 and the lower edge 62 are provided with fins 60c and 62c, respectively. The fins 60c are provided at the lower ends of the side edges 60, and below (in the closing direction) of zip fasteners 11. Thus, the side edges 60 can be folded along the corners A and the fins 60c can be made to extend along the floor 8 when the sheet 10 is placed over the opening 2. The fins 60c have a rectangular shape and a length in the width direction of the opening 2 corresponding to the length of the lower edge 62 in the opening/closing direction.

[0149] The fins 62c have a rectangular shape and are provided at the ends in the width direction of the lower edge 62. The length from the tip of one fin 62c to the tip of the other fin 62c is longer than the width of the opening 2. Thus, the lower edge 62 can be folded along the corners A so that the fins 62c are raised from the floor 8 and the fins 62c can be made to extend along the wall faces 3a and 3b when the sheet 10 is placed over the opening 2.

[0150] As illustrated in FIG. 36, the sheet 10 is placed in a manner that the fins 60c of the side edges 60 overlap with the lower edge 62 and that the fins 62c of the lower edge 62 overlap with the side edges 60. In the present embodiment, the fins 60c are overlaid on the lower edge 62 and the fins 62c are overlaid on outer sides of the side edges 60 in the width direction.

[0151] With the sheet 10 according to the present modified example, the floor 8 and the wall faces 3a and 3b can be covered together by the lower edge 62 and the side edges 60, respectively, at the same time, and the contact areas between the floor 8, the wall faces 3a, 3b and the fins 60c, 62c in the vicinity of the corners A can be made larger. Furthermore, the contact areas between the fins 60c and the lower edge 62 and the contact areas between the fins 62c and the side edges 60 can be made larger. This has an advantage that the effect of preventing ingress of water into the interior is increased.

[0152] Note that the overlap of lower ends of the side edges 60 and the ends in the width direction of the lower edge 62 is not limited to that illustrated. For example, the lower edge 62 may be overlaid on the fins 60c and the fins 62c may be overlaid on the side edges 60 inside in the width direction. Furthermore, the shapes of the fins 60c and 62c may be determined to be any shape other than a rectangle.

[Third Modified Example of Third Embodiment]

[0153] A third modified example of the third embodiment will be described. FIG. 38 is a perspective view of a main part of a sheet according to the third modified example of the third embodiment placed over an opening; and FIG. 39 is

a development view of the sheet according to the third modified example of the third embodiment.

[0154] As illustrated in FIG. 38, with a sheet 10 according to the present modified example, corner portions 64 (see FIG. 39) can be folded along broken lines 64a and overlaid on the lower edge 62 to make the lower ends of the side edges 60 and the ends in the width direction of the lower edges 62 overlap with one another. As illustrated in FIG. 39, the corner portions 64 are rectangular areas, such as substantially square areas, at the lower end and at the ends in the width direction of the sheet 10. The corner portions 64 serve as part of the side edges 60 and also serve as part of the lower edge 62.

[0155] As a result of being folded outward along the broken lines 64a and inward along broken lines 64b and 64c illustrated in FIG. 39, the corner portions 64 are folded into a triangular shape. The parts folded into the triangular shape are overlaid on the lower edge 62. As a result of folding the side edges 60 along the broken lines 64b along the corners A, the side edges 60 can cover the floor 8 and the wall faces 3a and 3b together. Thus, gaps are prevented from being caused between the sheet 10 and the corners A, and ingress of water into the interior can be prevented.

[0156] The manner in which the corner portions 64 are folded and the manner in which the lower ends of the side edges 60 and the ends in the width direction of the lower edge 62 overlap are not limited to those illustrated. For example, the folded corner portions 64 may be overlaid on the side edges 60 instead of being overlaid on the lower edge 62. Furthermore, the corner portions 64 may be folded inward along the broken lines 64a instead of being folded outward. In this case, the folded corner portions 64 can be laid under the lower edge 62 or overlaid outside in the width direction on the side edges 60.

[Fourth Modified Example of Third Embodiment]

[0157] A fourth modified example of the third embodiment will be described. In the third embodiment and the modified examples of the third embodiment, the parts where the lower ends of the side edges 60 and the ends in the width direction of the lower edge 62 overlap may be pressed against the floor 8 by a pressing member. The pressing member can be like a flat bar 16 illustrated in FIG. 5, for example. The pressing member preferably has corner portions that can press the sheet 10 against the corners A. As a result of placing the pressing member to press the sheet 10 against the corners A in a state in which the lower ends of the side edges 60 and the ends in the width direction of the lower edge 62 overlap, gaps between the sheet 10 and the corners A can be made as small as possible.

[0158] For example, for the sheet 10 according to the third embodiment (see FIG. 32), the pressing member is preferably placed on the lower ends 60a of the side edges 60 to press the side edges 60 against the corners A. Alternatively, for the sheet 10 according to the first modified example of the third embodiment (see FIG. 34), the pressing member is preferably placed on the fins 60b to press the side edges 60 against the corners A. Alternatively, for the sheet 10 according to the second modified example of the third embodiment (see FIG. 36), the pressing member is preferably placed on the fins 60c to press the side edges 60 against the corners A. Alternatively, for the sheet 10 according to the third modified example of the third embodiment (see FIG. 38), the pressing member is preferably placed on the corner portions 64 to press the side edges 60 and the corner portions 64 against the corners A.

[0159] The disclosure of the embodiments and the modified examples described above can be carried out in combinations where appropriate.

Reference Signs List

[0160]

1-1, 1-2, 1-3, 2-1, 3-1	waterproof device for opening
1	structure
2	opening
3	wall
3a, 3b	wall face
4	shutter curtain
4a	slat
5	guide rail
8	floor
10	sheet
13	sheet lower part
16, 18, 50	pressing member
20	holding part
60	side edge
62	lower edge

Claims

1. A waterproof device for an opening, comprising:

5 a sheet placed over an opening, the opening making an interior and an exterior of a structure communicate and being opened and closed by an opening/closing member; and
 a holding part that holds the sheet for the structure at a position exterior of the opening/closing member, wherein the holding part holds the sheet so that the sheet covers a predetermined area which is a lower end part in a vertical direction of the opening/closing member and a part of the structure adjacent to the predetermined area
 10 together to close a lower end area in the vertical direction of the opening and so that a lower end part in the vertical direction of the sheet extend along a floor toward the exterior.

2. The waterproof device for an opening according to claim 1, wherein the holding part holds the sheet in a slack state, permitting the sheet to be bent closer to the opening/closing member than the holding member and come into contact with the predetermined area.

3. The waterproof device for an opening according to claim 1 or 2, wherein the sheet covers the predetermined area, the floor adjacent to the predetermined area, and wall faces adjacent to the predetermined area and opposed to each other in a width direction of the opening all together, and the sheet can be placed in a state in which ends in the width direction of a part corresponding to the floor and lower ends of parts corresponding to the wall faces overlap.

4. The waterproof device for an opening according to claim 3, wherein the parts of the sheet corresponding to the wall faces can cover the wall faces and the floor together.

5. The waterproof device for an opening according to claim 3 or 4, wherein the sheet has slits separating the ends in the width direction of the part corresponding to the floor and the lower portions of the parts corresponding to the wall faces from each other.

6. The waterproof device for an opening according to any one of claims 1 to 5, further comprising:

a pressing member that presses a part of the sheet extending along the floor against the floor.

7. The waterproof device for an opening according to claim 6, wherein the pressing member is water absorbent.

8. The waterproof device for an opening according to claim 1, further comprising:

pressing members that press the sheet against the structure, wherein the pressing members are arranged at least on a part of the sheet extending along the floor and continuously along a circumference of the opening.

9. The waterproof device for an opening according to claim 8, wherein the pressing members are deformable to match with a shape of the structure.

10. The waterproof device for an opening according to claim 9, wherein the pressing members arranged on the part of the sheet extending along the floor deform to match with a shape of the floor by weights thereof.

11. The waterproof device for an opening according to claim 8 or 10, wherein the pressing members arranged on the part of the sheet extending along the floor are continuously provided from one end in the width direction of the opening to the other.

12. The waterproof device for an opening according to claim 11, wherein the sheet covers the predetermined area, the floor adjacent to the predetermined area, and wall faces adjacent to the predetermined area and opposed to each other in a width direction of the opening all together, and the pressing members arranged on the part of the sheet extending along the floor are placed to press the sheet against the wall faces.

13. The waterproof device for an opening according to claim 11 or 12, wherein

the pressing members arranged on the part of the sheet extending along the floor have corner portions having a shape corresponding to that of corners where the floor and the wall faces intersect, and are placed in a state in which the sheet is between the corner portions and the corners.

5 **14.** The waterproof device for an opening according to any one of claims 11 to 13, wherein
the ends of the pressing members in the width direction of the opening are deformable to match with shapes of the
wall faces by being pressed against the wall faces.

10 **15.** The waterproof device for an opening according to claim 1 or 2, wherein the ends in the width direction of the part
of the sheet extending along the floor is subjected to end processing beforehand according to the width of the opening.

16. The waterproof device for an opening according to any one of claims 1 to 8 and 15, further comprising:

15 a supporting member that supports the opening/closing member against a force applied by water pressure from
the exterior to prevent deformation of the opening/closing member.

17. A waterproof sheet for an opening, wherein
the waterproof sheet is placed over an opening, the opening making an interior and an exterior of a structure
communicate and being opened and closed by an opening/closing member, wherein the waterproof sheet is placed
20 at a position exterior of the opening/closing member,
the waterproof sheet is held for the structure in a slack state, permitting the waterproof sheet to come into contact
with the opening/closing member, and with a lower end part thereof in a vertical direction extending along a floor
toward the exterior, and
the waterproof sheet covers a predetermined area at a lower end part in the vertical direction of the opening/closing
25 member and a part of the structure adjacent to the predetermined area to close a lower end part in the vertical
direction of the opening.

FIG.1

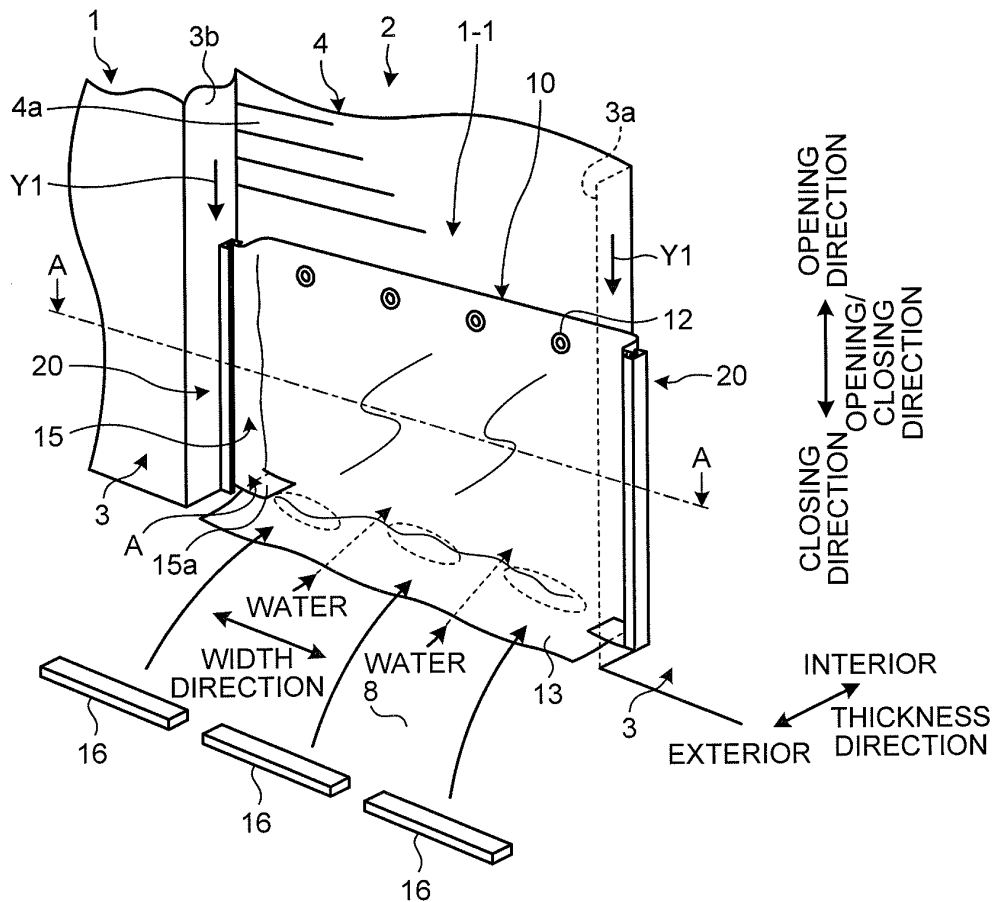


FIG.2

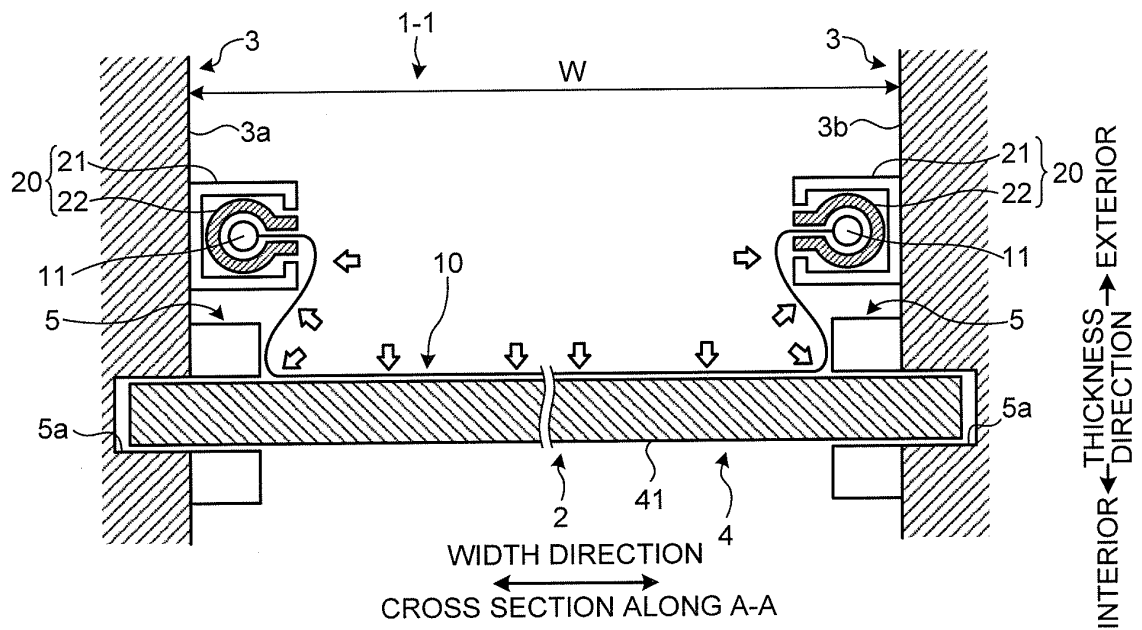


FIG.3

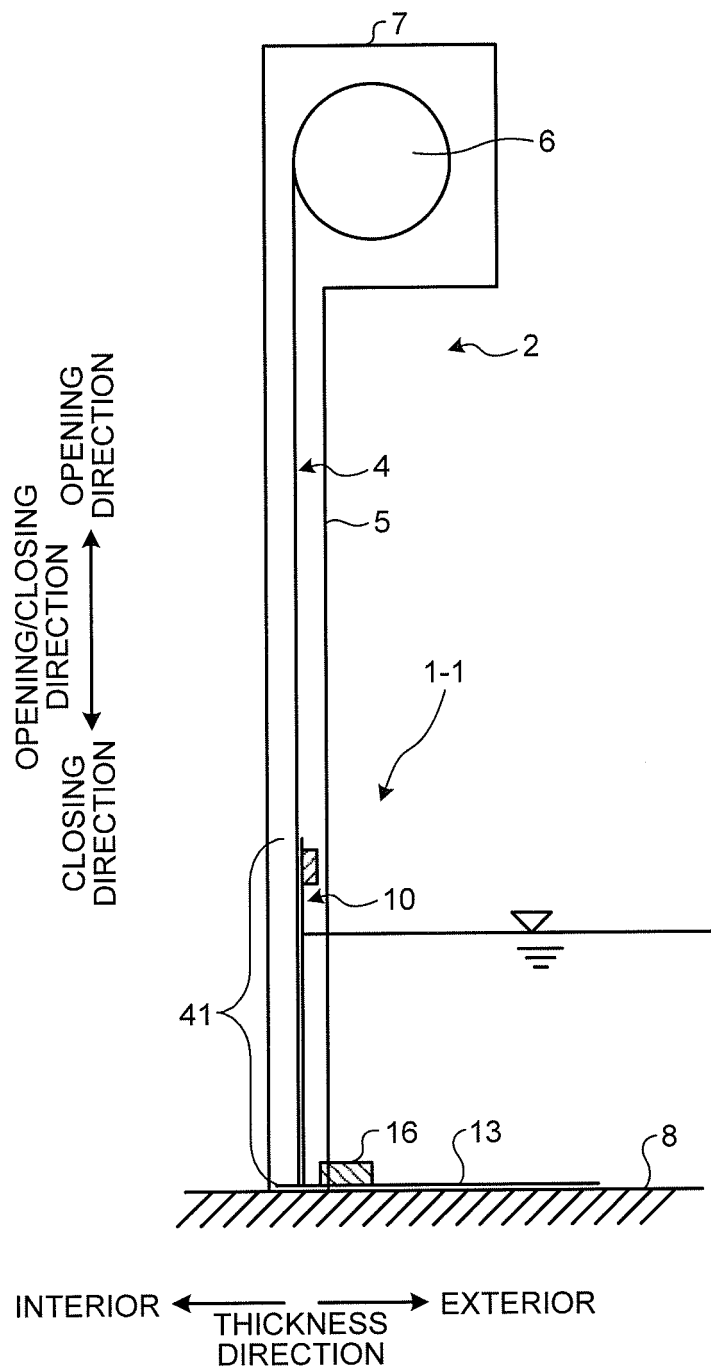


FIG.4

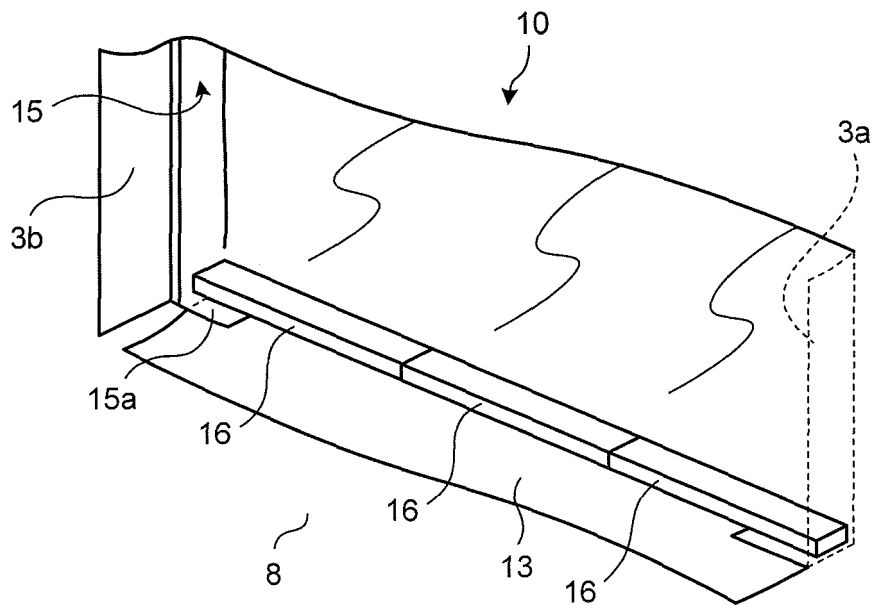


FIG.5

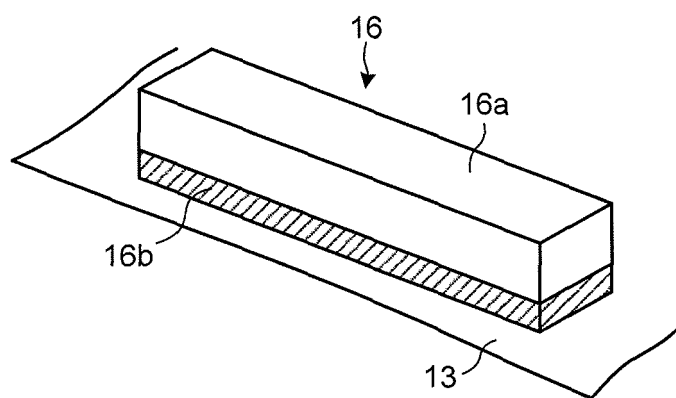


FIG.6

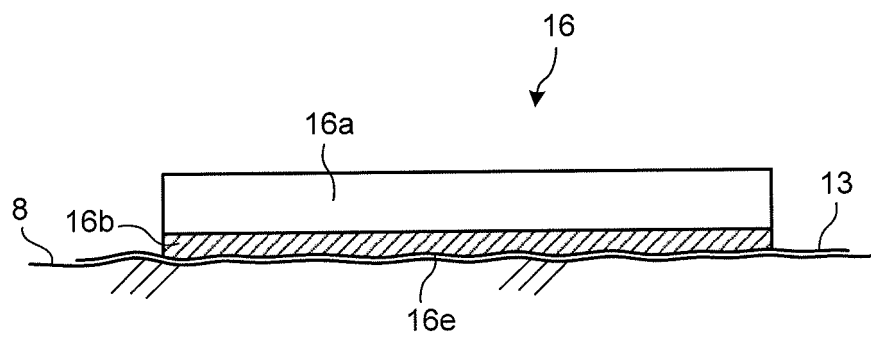


FIG.7

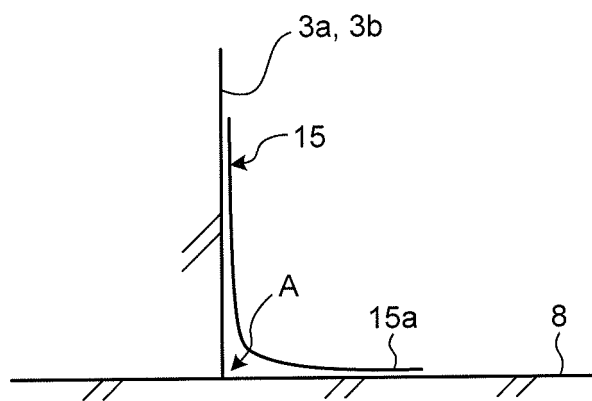


FIG.8

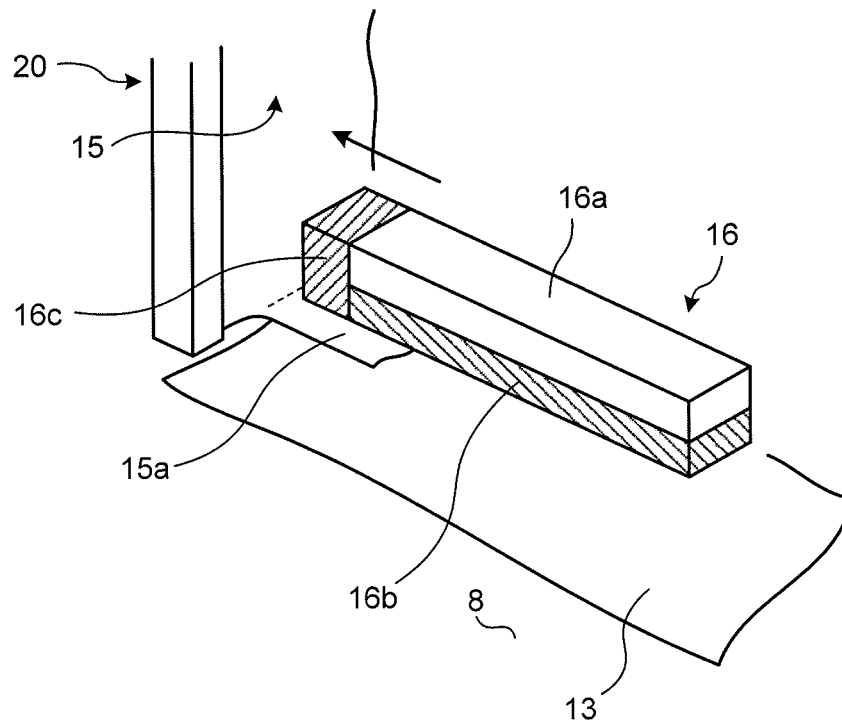


FIG.9

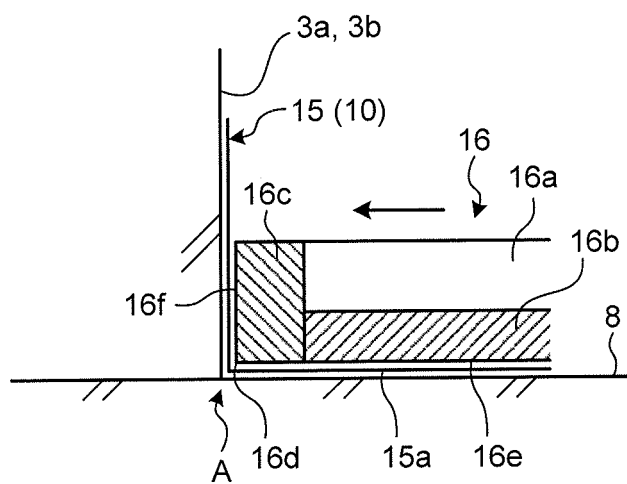


FIG.10

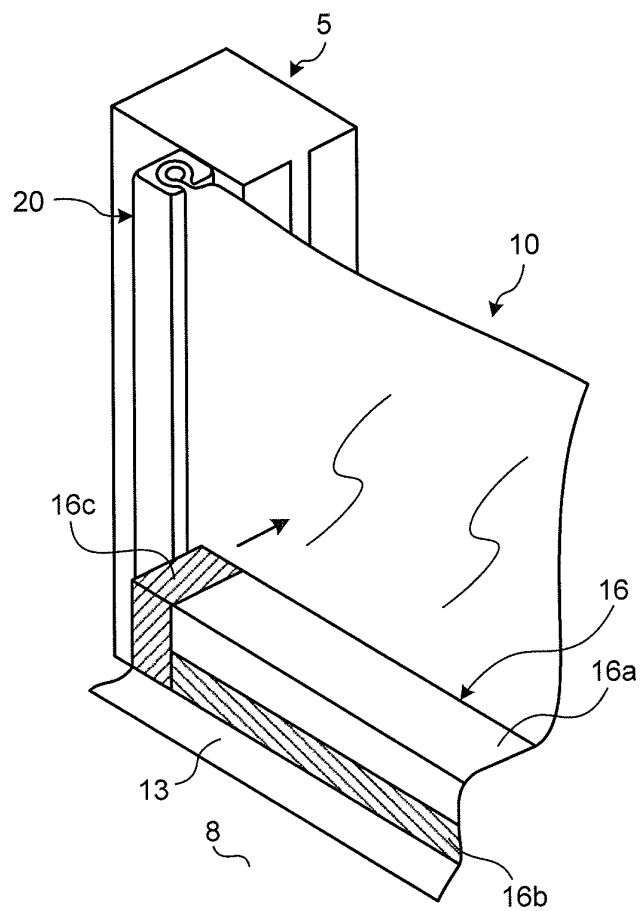


FIG.11

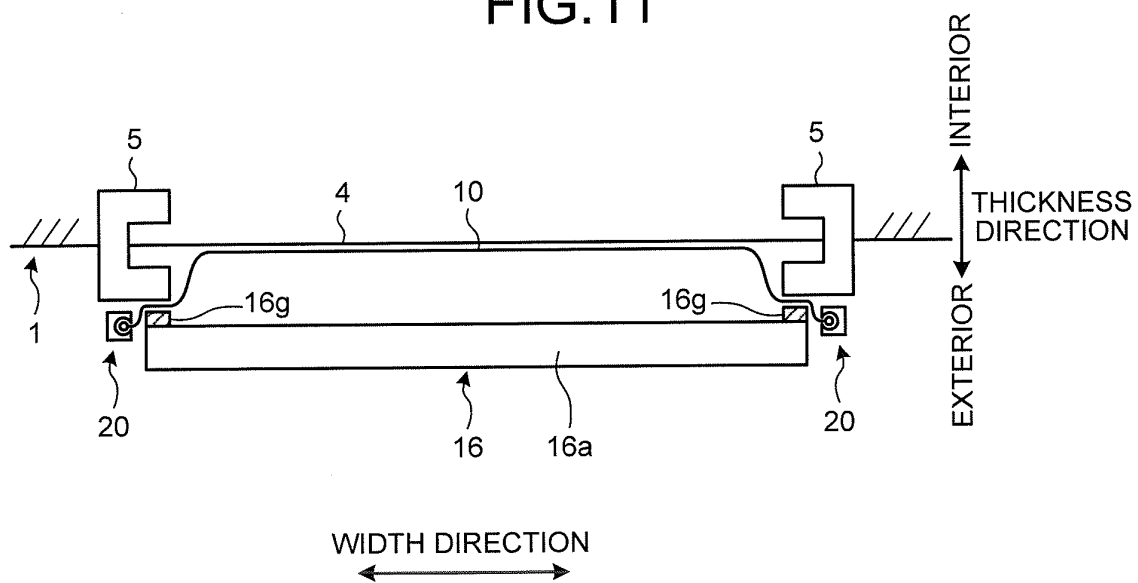


FIG.12

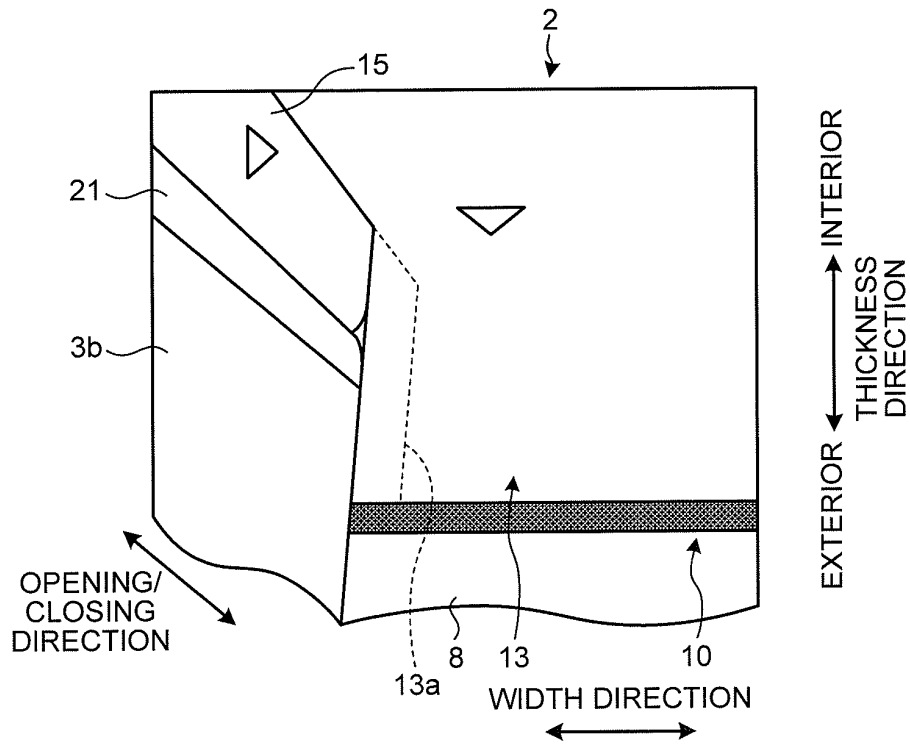


FIG.13

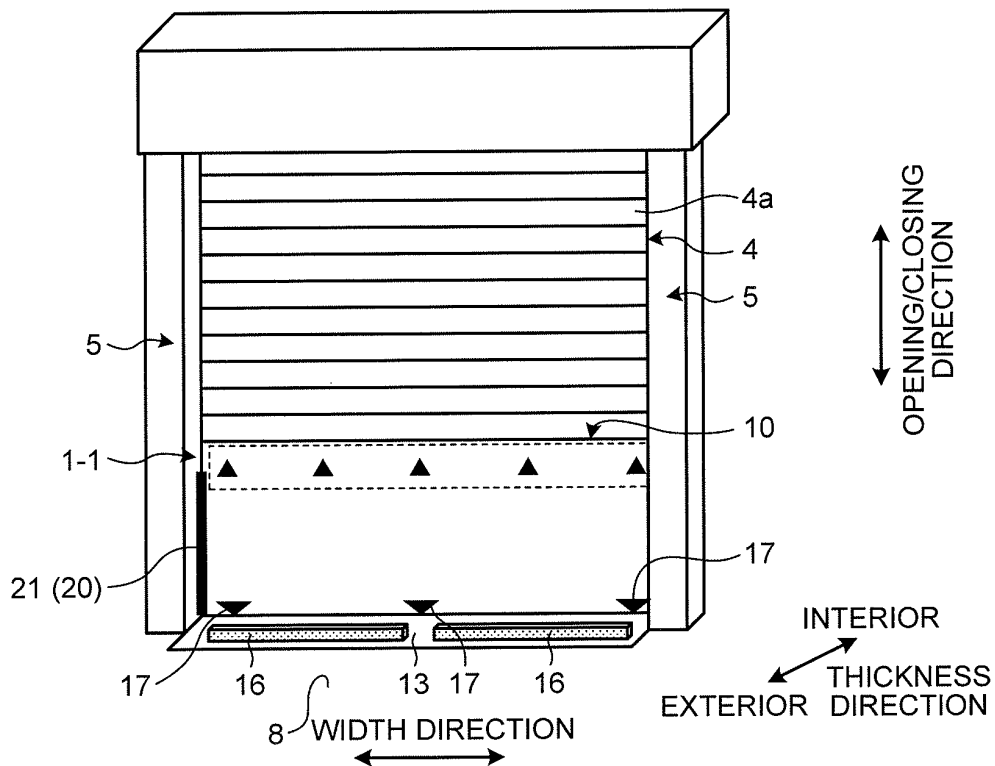


FIG.14

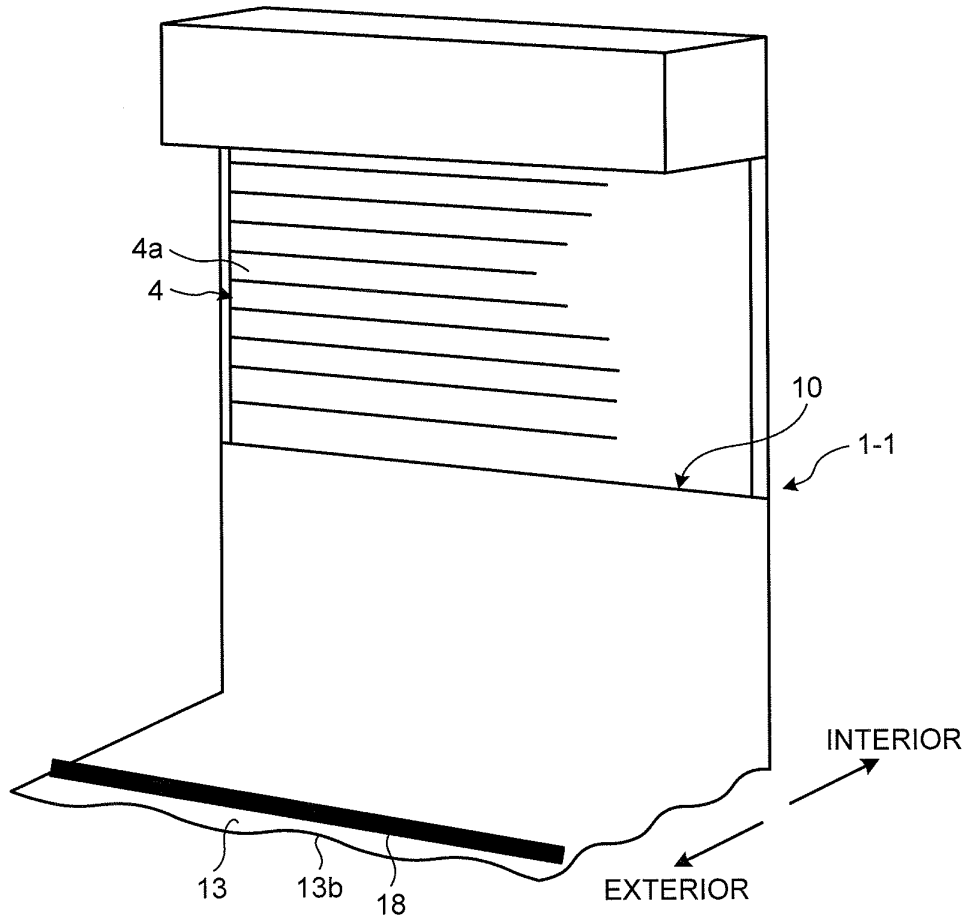


FIG.15

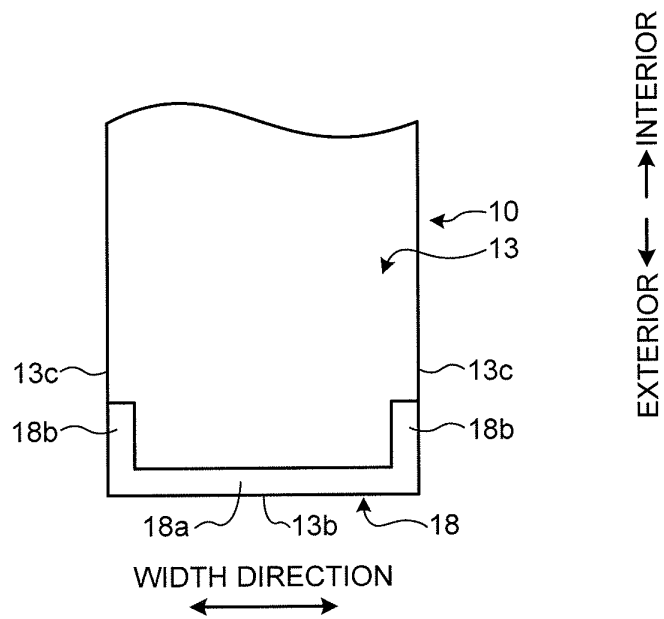


FIG.16

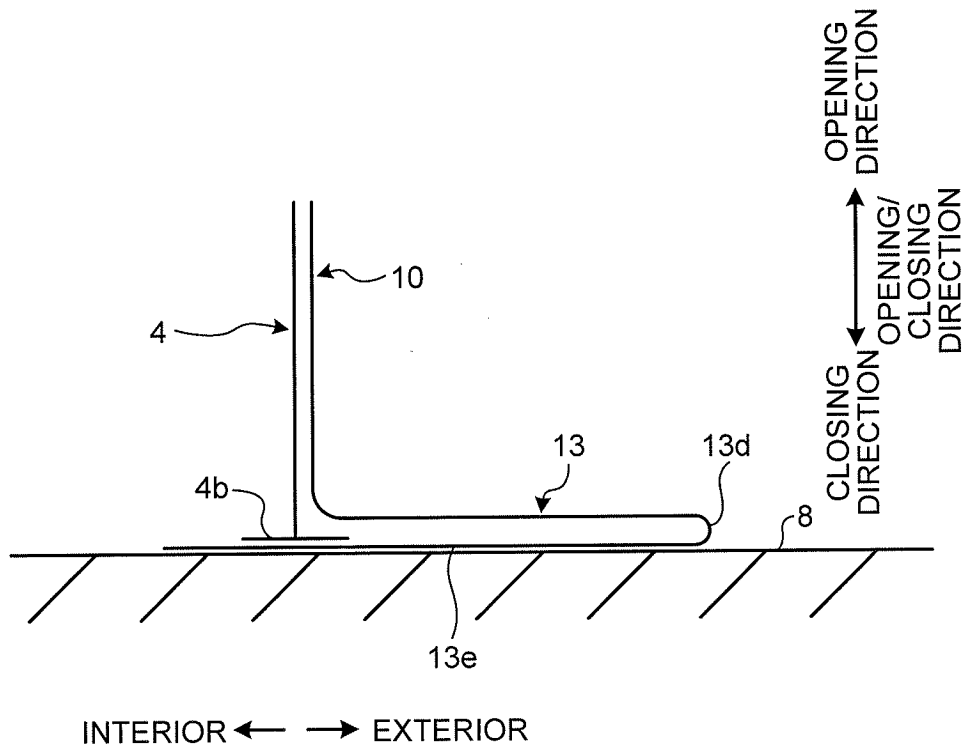


FIG.17

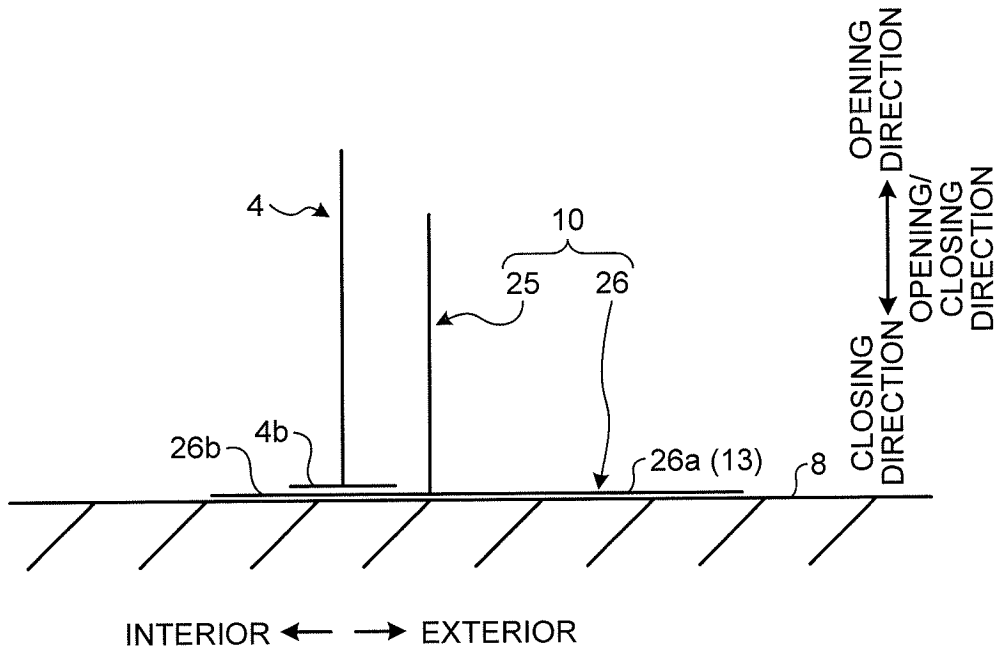


FIG.18

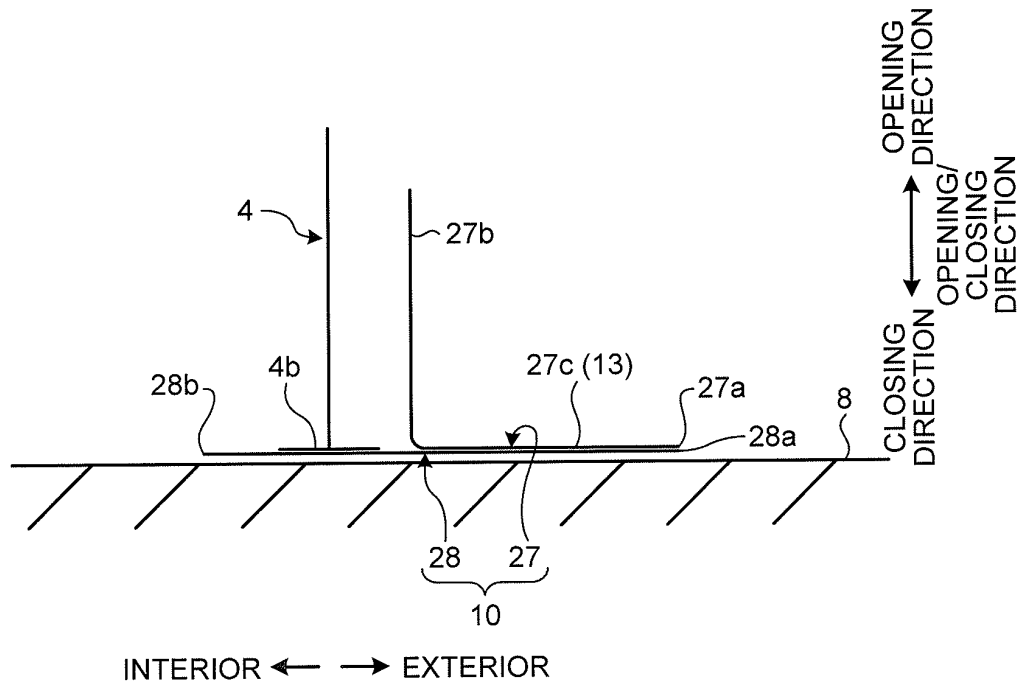


FIG.19

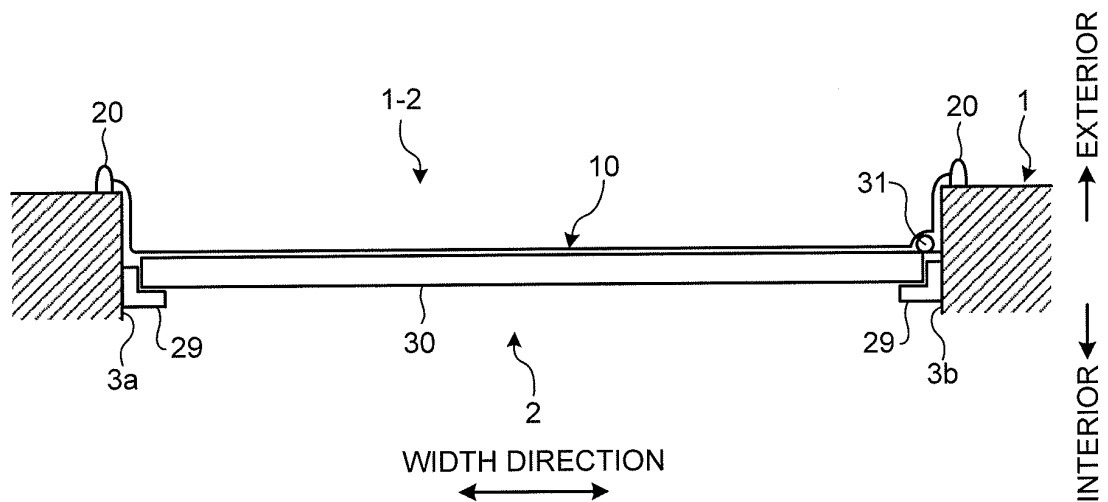


FIG.20

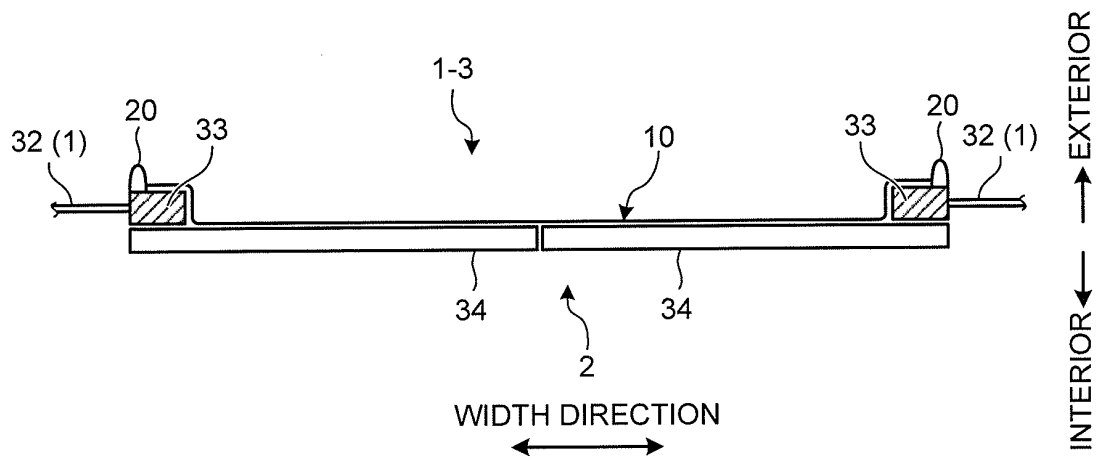


FIG.21

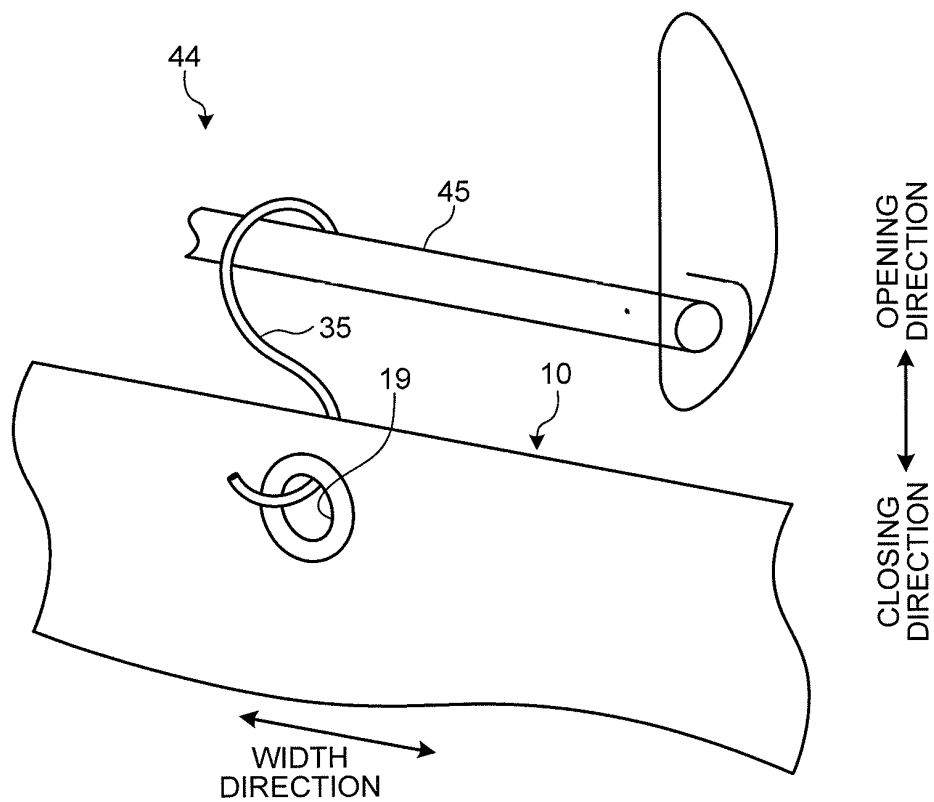


FIG.22

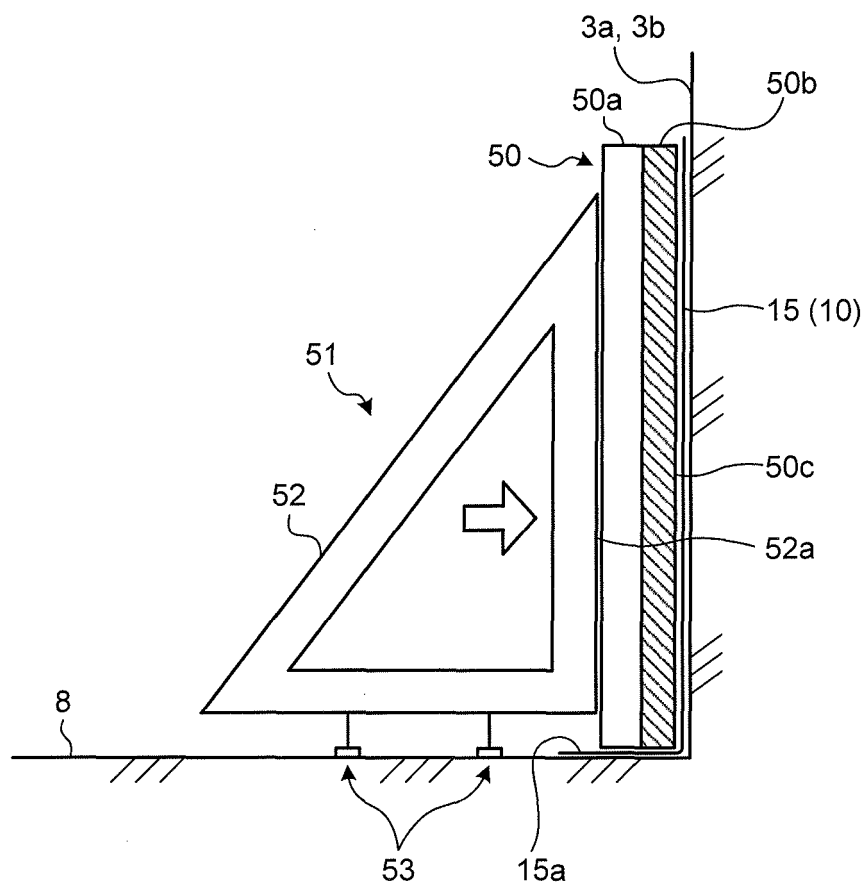


FIG.23

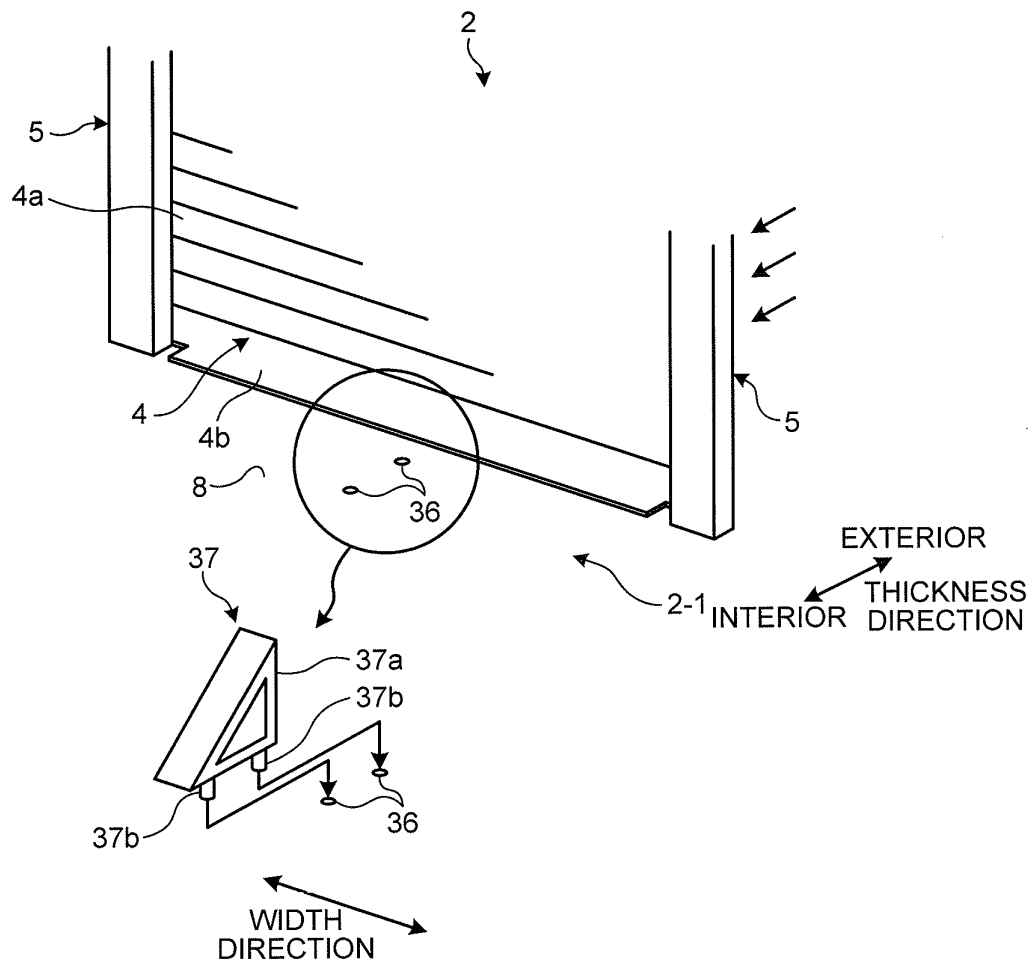


FIG.24

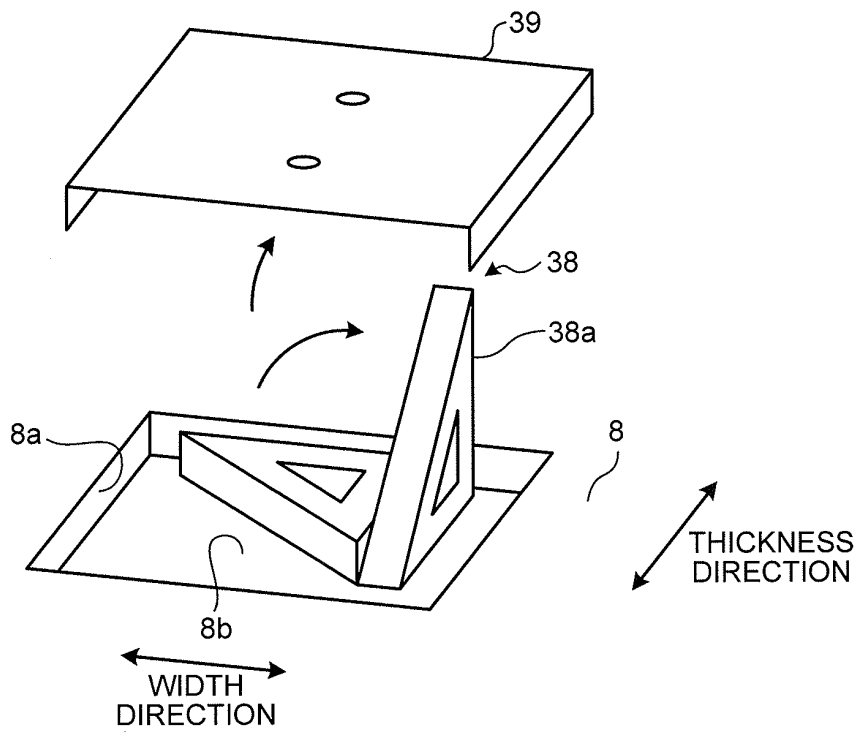


FIG.25

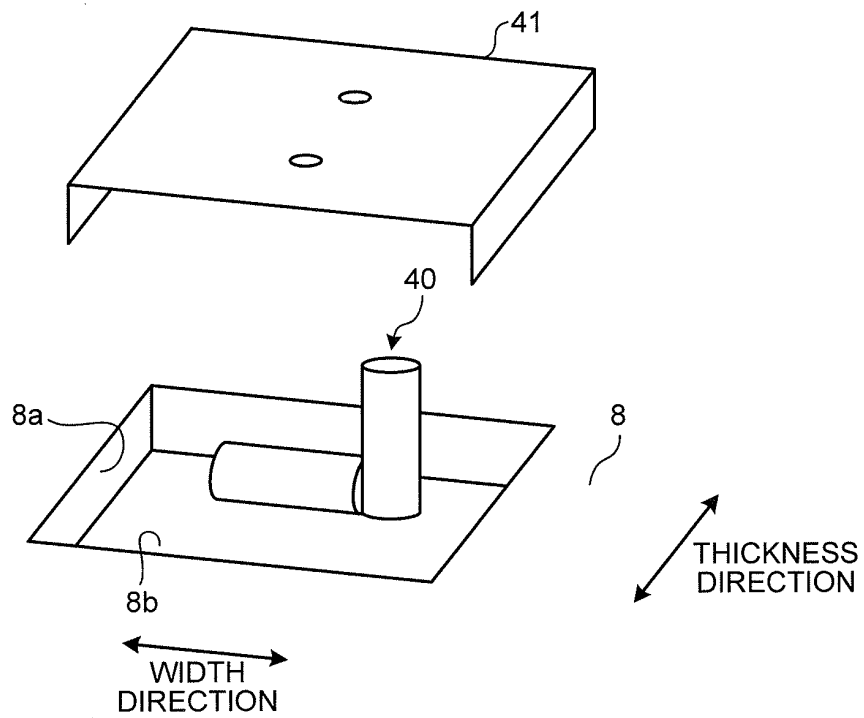


FIG.26

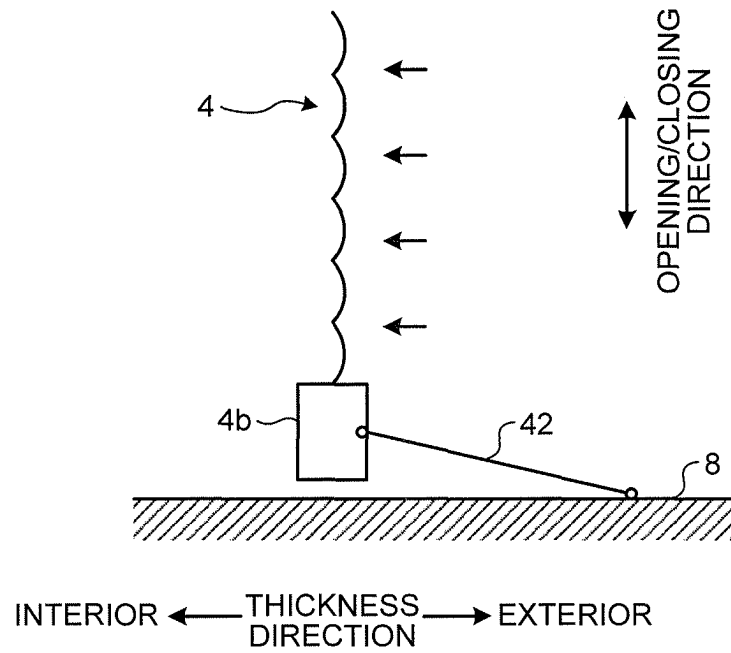


FIG.27

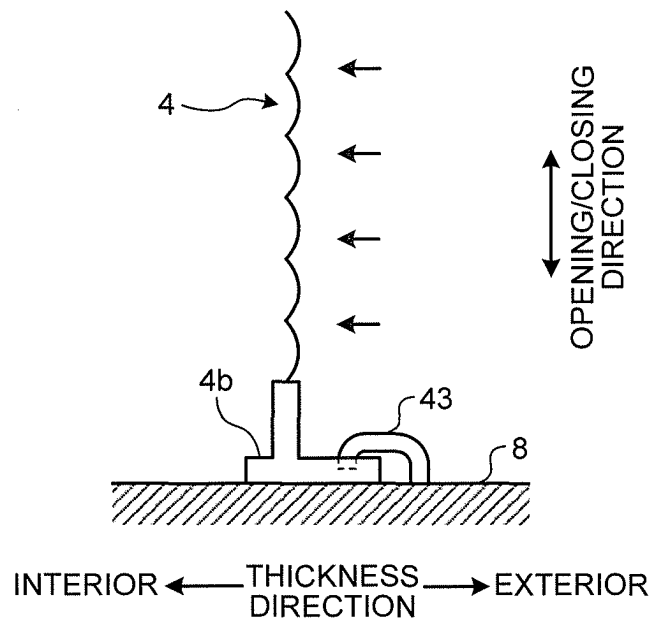


FIG.28

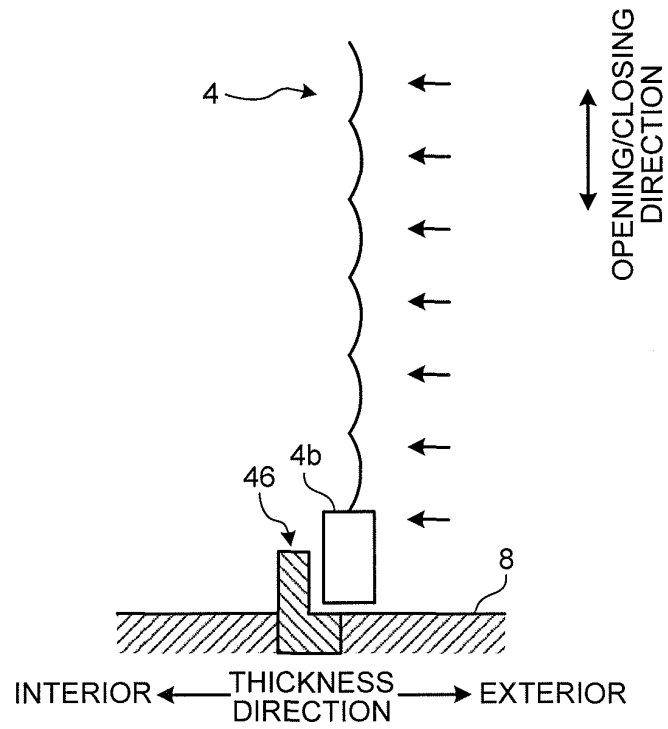


FIG.29

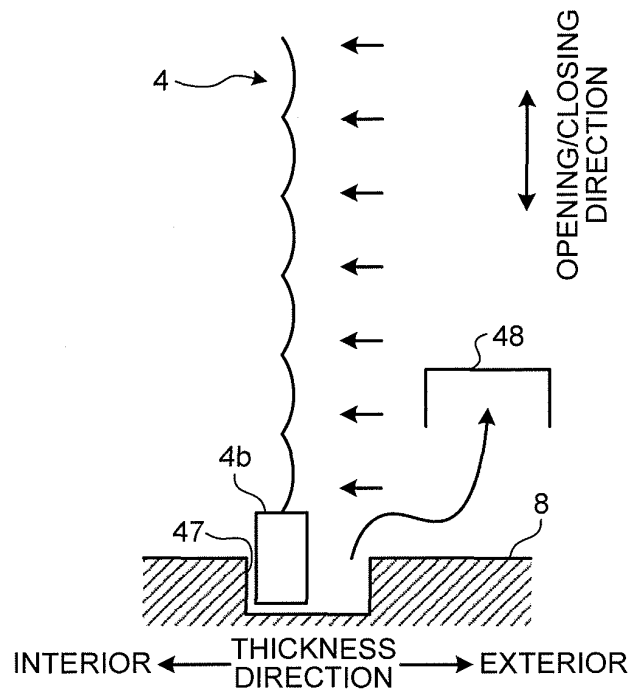


FIG.30

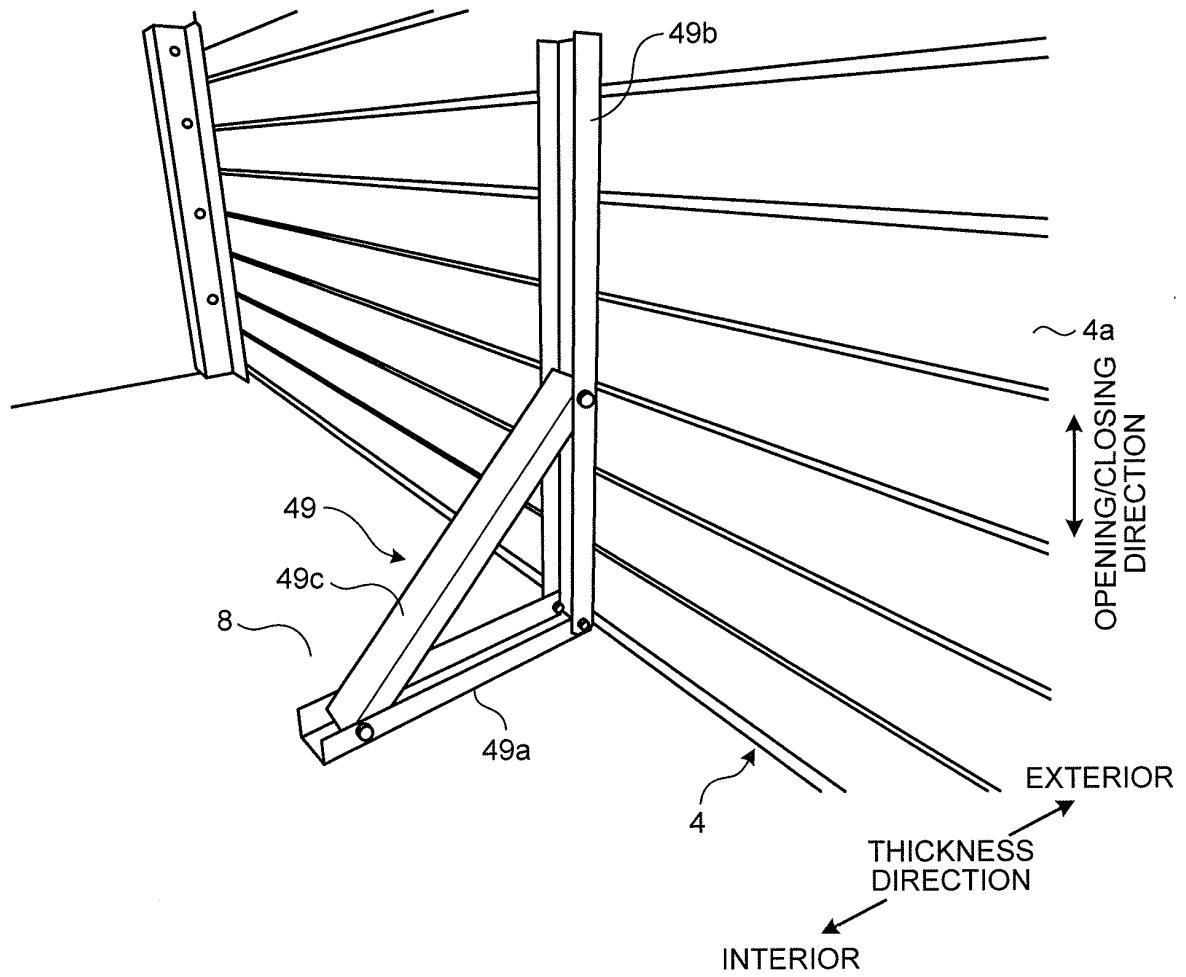


FIG.31

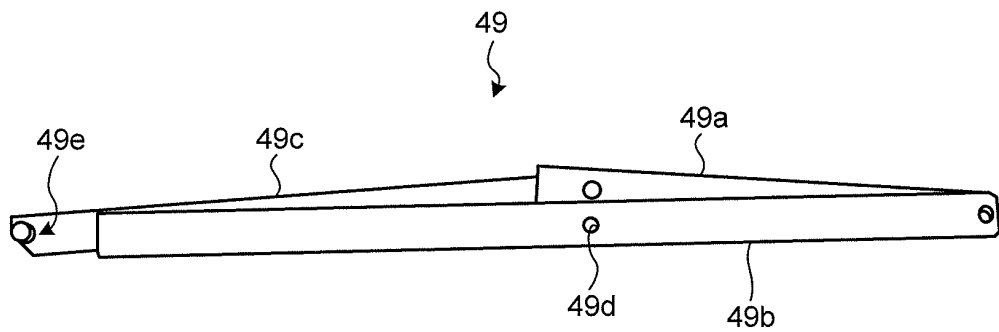


FIG.32

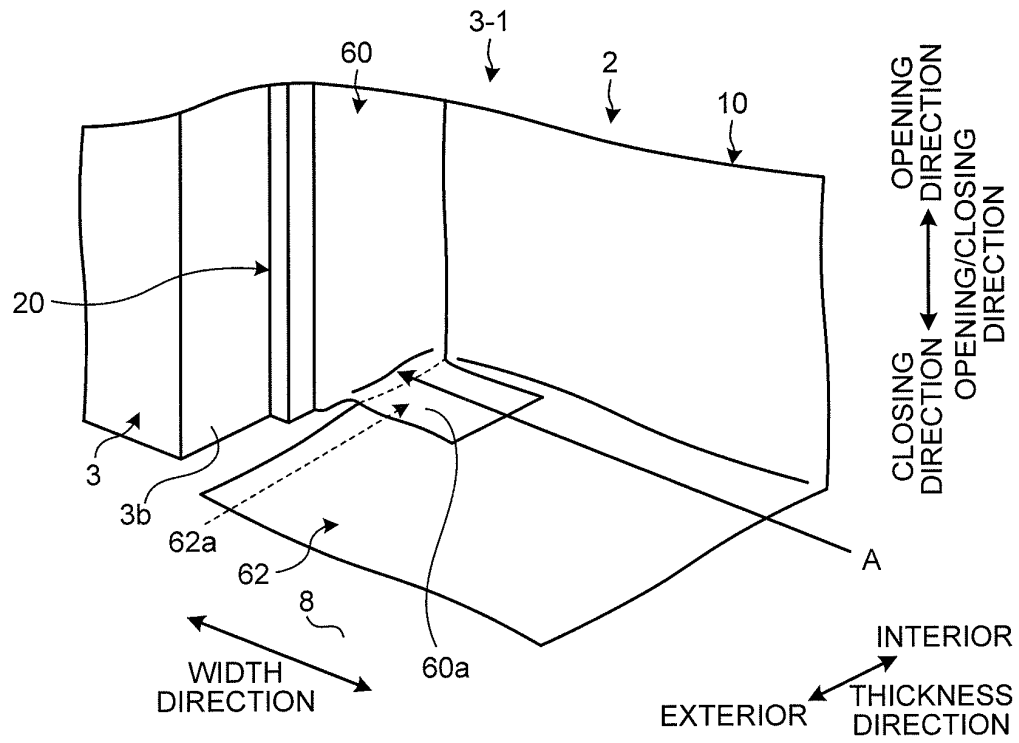


FIG.33

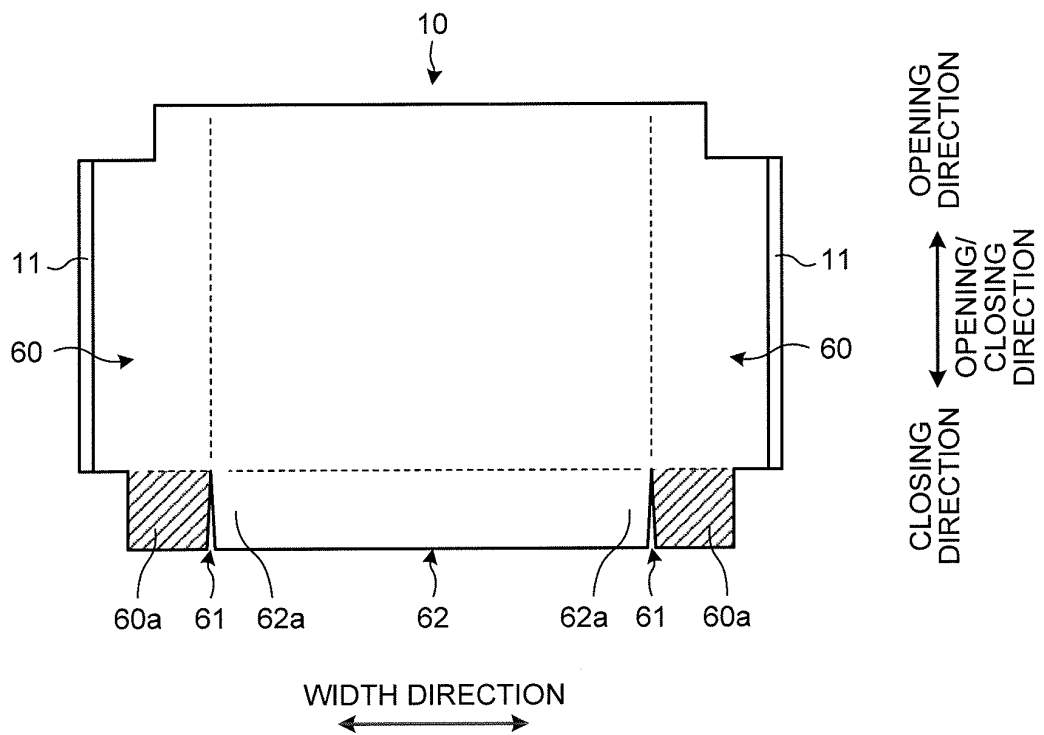


FIG.34

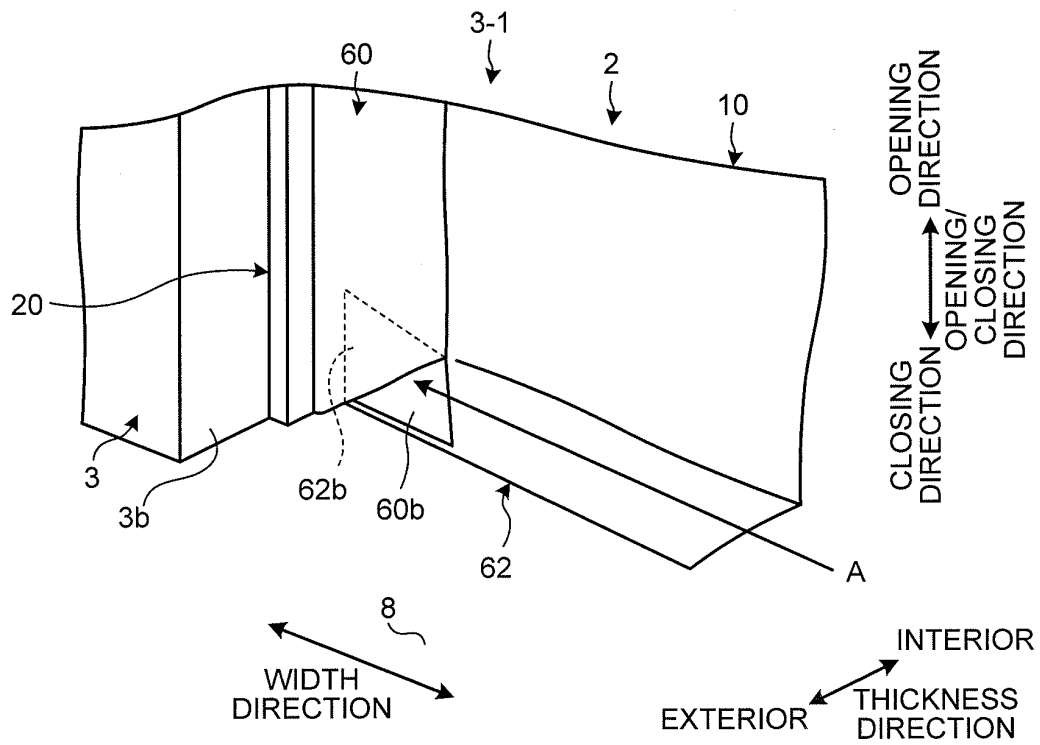


FIG.35

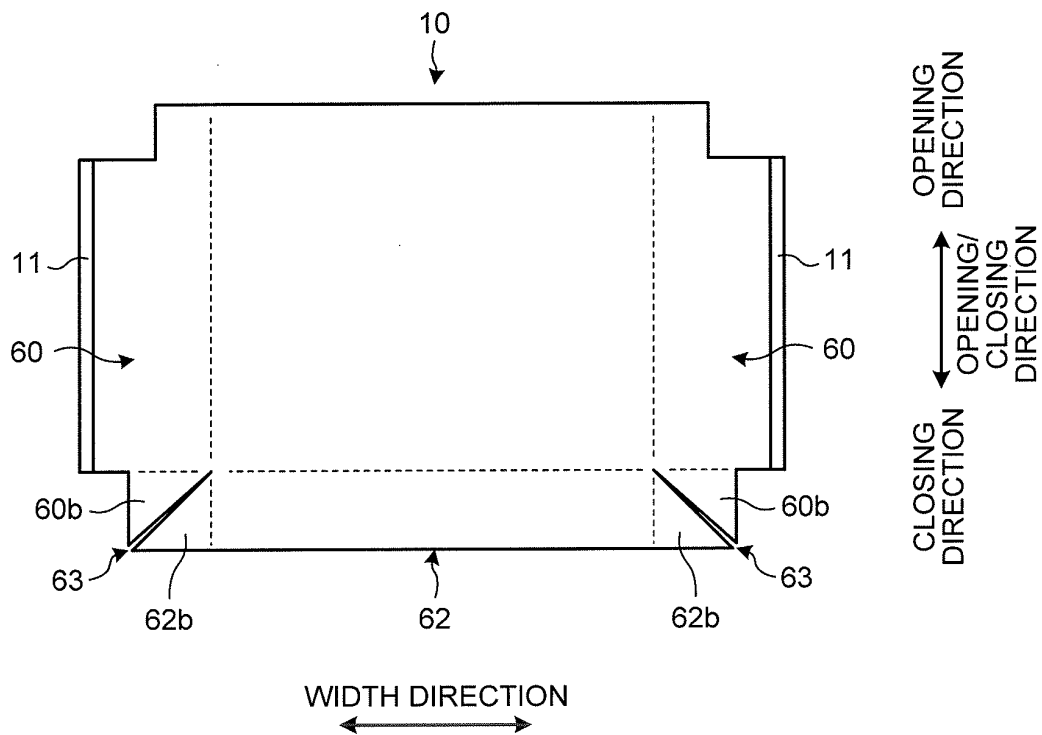


FIG.36

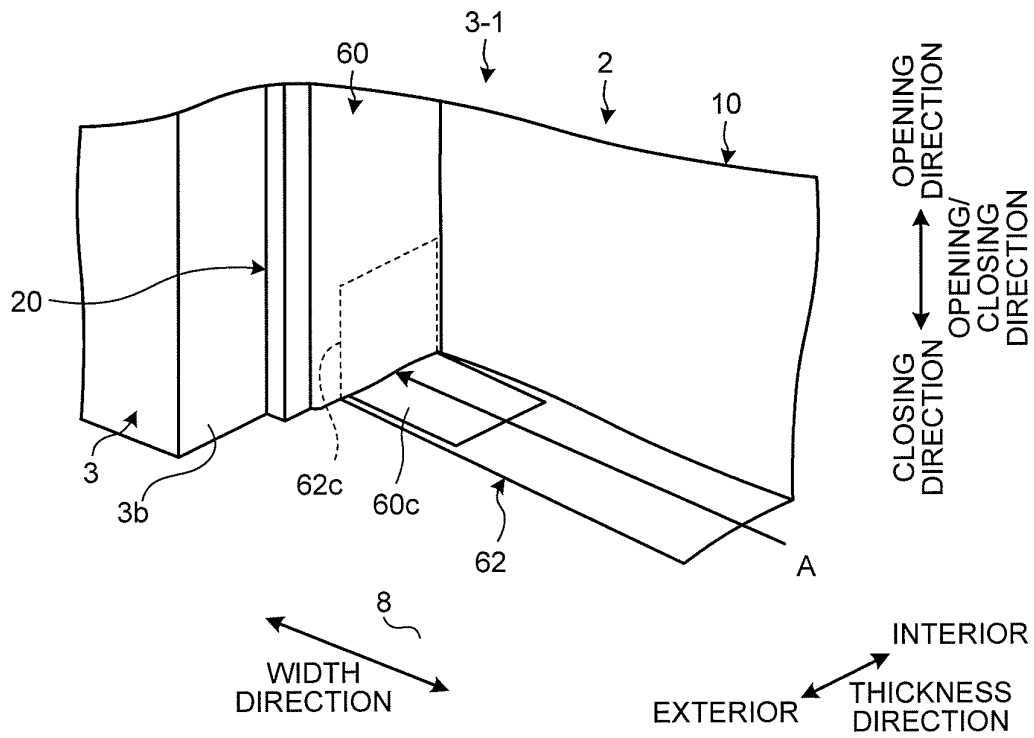


FIG.37

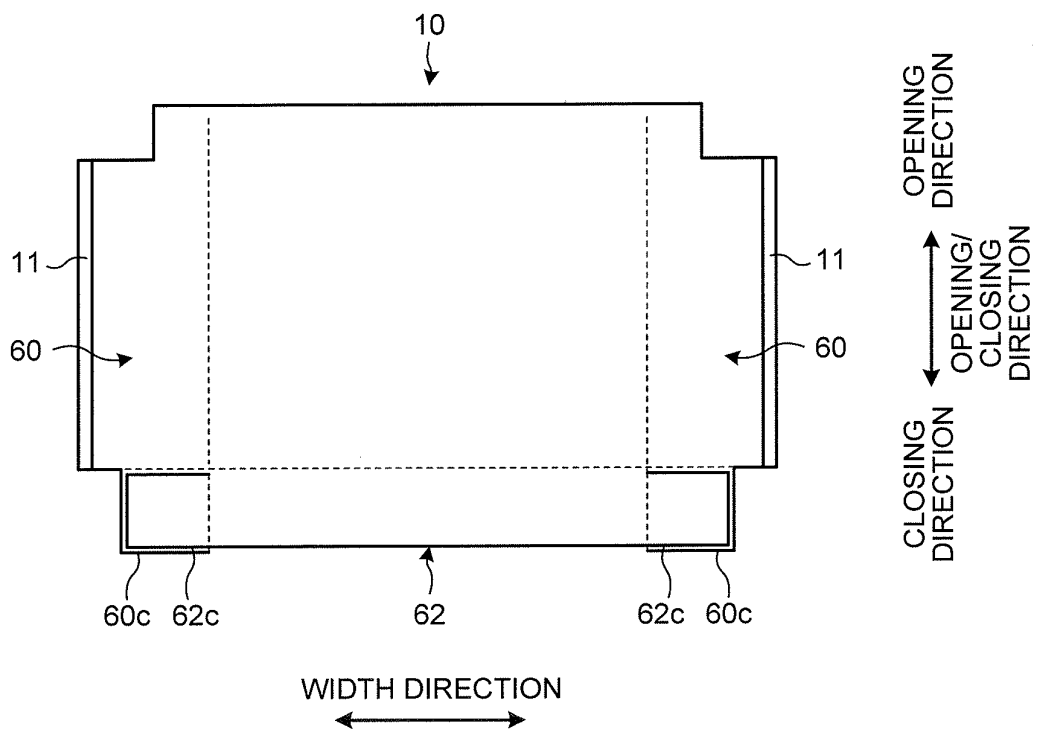


FIG.38

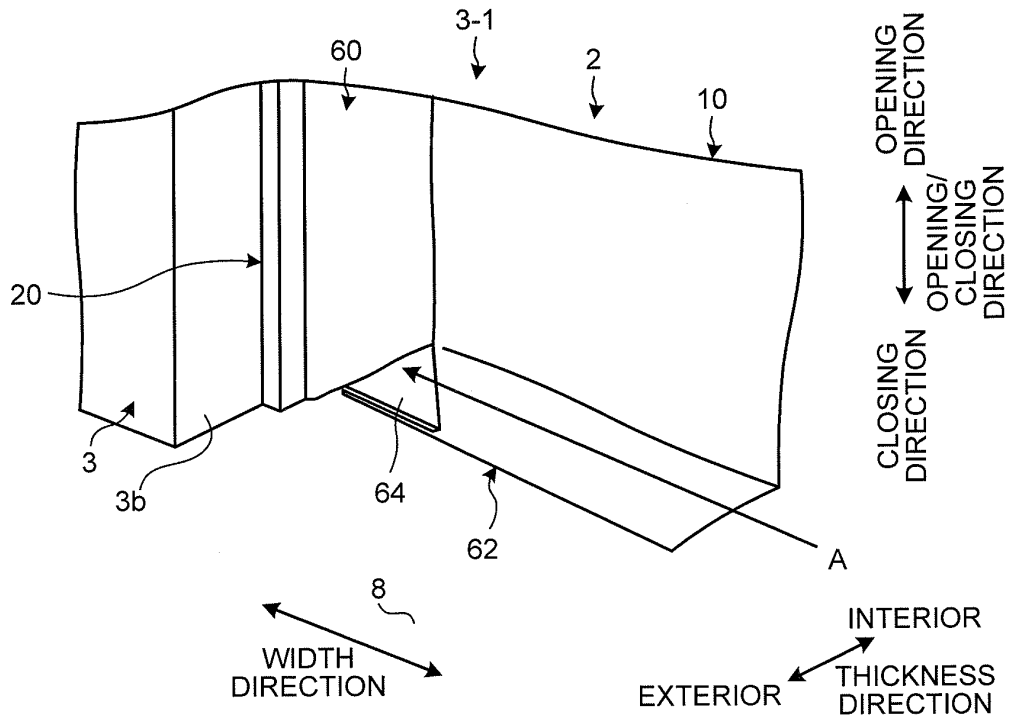
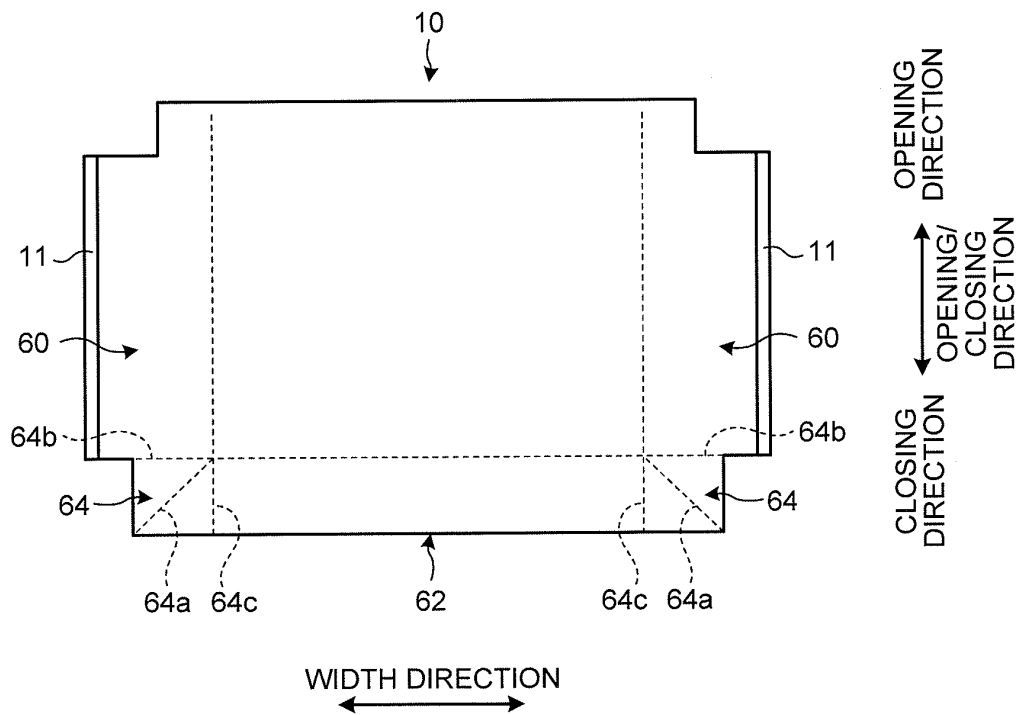


FIG.39



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/078499

A. CLASSIFICATION OF SUBJECT MATTER

E06B9/17(2006.01) i, E06B5/00(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E06B9/17, E06B5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012

Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2010-65391 A (Shigeharu MENRAI), 25 March 2010 (25.03.2010), entire text; fig. 1 to 7 (Family: none)	1, 2, 6-11, 15, 17 3-5, 12-14, 16
A		
Y	JP 63-210307 A (Nippon Telegraph and Telephone Corp.), 01 September 1988 (01.09.1988), entire text; fig. 1 to 4 (Family: none)	1, 2, 6-11, 15, 17 3-5, 12-14, 16
A		
A	JP 3-7508 Y2 (Sanwa Shutter Corp.), 25 February 1991 (25.02.1991), entire text; fig. 1 to 4 (Family: none)	1-17

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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Date of the actual completion of the international search
03 December, 2012 (03.12.12)Date of mailing of the international search report
11 December, 2012 (11.12.12)Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/078499

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-182452 A (Hokoku Kogyo Co., Ltd.), 06 July 2001 (06.07.2001), entire text; fig. 1 to 8 (Family: none)	1-17

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Patent documents cited in the description

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